Accounting Based Valuation Formulae

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1. Introduction

Equity valuation is a topic of great interest in practice and academia. The broad issue concerns the forecasting of future expected "payoffs" which are then converted to some intrinsic equity value via use of some discount-factor. In this context the word "forecasting" refers to a complex set of skills which are difficult to describe and even harder to teach, when implemented in a superior fashion. Academics have much more to say about how one identifies the appropriate "payoffs" and how these are fed into valuation formulae. Students typically encounter 3 approaches to valuation: The discounting of, (i) dividends, (ii) cash flows and, (iii) residual earnings.

Practitioners of equity valuation, often to the chagrin of academics, tend to rely on none of the above class-room techniques. As a core organizing principle they tend to focus instead on forward earnings and the growth in the subsequent expected earnings, i.e., the greater the growth, the great the price to forward earnings ratio. Exactly how such a relation actually reflects a valuation formula is more of a mystery, but it can be developed.

This paper will show, using a relatively little known but simple technique, how one unifies various equity valuation models. The framework will reconcile the cash flows and residual income approaches to the more fundamental dividends approach. Moreover, we will develop a formula that determines value on the basis of, (i) next-year expected *eps* /or "forward *eps*," (ii) short-term growth - year 2 vs. next-year - in *eps*, (iii) long-term growth in *eps* and finally, (iv) the discount factor which relates directly to cost-of-capital. We will argue that the last formula is useful as it connects with analysts' concepts of how to value equities.

2. The Valuation Attribute - A Quick Review

The theoretical starting point in equity valuation is the so-called PVED formula, i.e., PVED stands for the present value of expected dividends:

$$P_0 = \sum_{t=1}^{\infty} R^{-t} d_t$$

where

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P_0 = the value of equity
$R = 1 + r > 1$ is the discount factor or 1 plus the cost-of-equity capital
d_t = the expected dividend at date t.

The formula raises questions about the dividend policy. Who wants to forecast dividends if the dividend policy is irrelevant? Or, stated somewhat differently, should we not focus on the value creation rather than the value distribution? Finance text-books tend to deal with these questions by introducing the present value of "free cash flows" or FCF. Specifically, the formula is:

$$P_0 = -D_0 + \sum_{t=1}^{\infty} R^{-t} c_t$$

where

D_0 = the debt outstanding today
c_t = expected FCF, date t.

Text-book often motivates this scheme by the saying "cash is king!" As a practical matter, however, "cash" is a more ambiguous concept than one might think initially. And it is not so obvious that FCF reflects value-creation, a point that accountants surely appreciate.

To introduce accounting data as a valuation attribute, Financial Statement Analysis text-books generally introduce the so-called Residual Income Valuation, or RIV, formula:

$$P_0 = bv_0 + \sum_{t=1}^{\infty} R^{-t} RI_t$$

where

$RI_t = ear_t - r.bv_{t-1}$
bv_t = expected book value, date t
ear_t = expected earnings, date t.

Experienced practitioners who happen to get exposed to this formula do not generally react favorably when it is suggested to be a useful tool: Why the emphasis on book value? In other words, it is well to note that practitioners do not start with the current book value and then try to estimate the incremental value via a forecasting of future residual earnings. In other words, what is missing is the core principle: the growth in earnings should explain the price to forward earnings ratio.

To partially address the issue of growth in earnings, text-books generally develop the so-called constant growth formula:

$$P_0 = \frac{ear_1}{r-g} \times K$$

where
$ear_{t+1} = (1+g).ear_t$, $t \geq 1$, and the dividend payout is fixed according to $d_t = K.ear_t$.

But this approach is so obviously unsatisfactory that must be given short shrift. The dividend-policy is far too stringent. In addition, the same can be said for the requirement that there is one and only one growth-ratio. The near term is in this regard no different from the long term.

The state-of-the-art as described is not encouraging. What one would like to see is a unifying framework of equity-valuation, including the possibility of providing a model that shows how the growth in expected earnings explains the P_0 / Ear_1 ratio, without placing unreasonable restrictions on the dividend policy. We will do so in the final part of the paper.

3. A General Framework for Equity Valuation

As always, we rely on PVED as a foundation. Thus the question becomes one of finding a scheme that gives equivalent representations, including PV of FCF and RIV.

The following scheme will prove to be exceedingly useful. Let $y_0, y_1, y_2, \ldots\ldots$ be any sequence of numbers, subject only to $y_t / R^t \to 0$ as $t \to \infty$ where the latter is merely a mild regularity condition. It follows immediately that

$$0 = y_0 + R^{-1}(y_1 - Ry_0) + R^{-2}(y_2 - Ry_1) + R^{-3}(y_3 - Ry_2) + \ldots\ldots$$

Adding this expression to PVED, one obtains

$$P_0 = y_0 + \sum_{t=1}^{\infty} R^{-t} z_t$$

where

$$z_t = y_t + d_t - R.y_{t-1}$$

In what follows, we have to keep in mind that the z_t - sequence depends directly on the y_t - sequence.

In applying the above mechanics, we put two central ideas into place. First, y_0 provides the starting-point in valuation. Second, we want to pick some accounting/economics constraint such that the z_t - sequence does *not* depend on the dividend policy. The last point is subtle: It allows us to shift the analysis away from the distribution of wealth to the creation wealth.

Next, we show how one applies the framework to the FCF and RIV approaches:

A. FCF

Put $y_t = -D_t$ = the negative of the expected debt at date t. Assume further that the debt incurs an interest expense according to the equation $int_t = rD_{t-1}$.

We partition activities into operating and financial activities. Thus, the balance sheet and the income statements can be summarized by

$$bv_t = oa_t - D_t$$
$$ear_t = opear_t - int_t$$

where

oa_t = operating assets net of operating liabilities, date t

$opear_t$ = earnings due to operations, date t

Let

$$c_t \equiv d_t + int_t - \Delta D_t$$

Or, equivalently, per text-books,

$$c_t = opear_t - \Delta oa_t$$

Assume that the clean surplus relation holds, i.e., $\Delta b_t = ear_t - d_t$.

With respect to z_t, one obtains

$$\begin{aligned} z_t &\equiv -D_t + d_t - R.D_{t-1} \\ &= int_t + d_t - \Delta D_t \\ &= c_t \end{aligned}$$

Thus, we have identified the assumptions that equate the PVED approach to the FCF approach. Importantly, if one further assumes, reasonably, that the operating activities do not depend on the dividend policy - i.e., net borrowings can always finance a change in the dividend-policy, then z_t does *not* depend on the dividend policy.

B. RIV

In this case put

$$y_t = bv_t$$

so that

$$z_t \equiv bv_t + d_t - R.bv_{t-1}$$

Given clean surplus, it follows immediately that

$$z_t = ear_t - r.bv_{t-1},$$

i.e., the PVED and RIV are identical representations of value. And, again, under the same assumption as in the previous case (FCF), z_t will *not* depend on the dividend policy.

We next provide the scheme that focuses on forward earnings and their subsequent growth. I will refer to this approach as the Abnormal Earnings Growth (AEG) model.

C. AEG
In this case put

$$y_t = ear_{t+1} / r$$

so that

$$\begin{aligned} z_t &= \frac{1}{r}\left(ear_{t+1} + r.d_t - R.ear_t\right) \\ &= \frac{1}{r}\left(\Delta ear_{t+1} - r.(ear_t - d_t)\right) \end{aligned}$$

One interprets $r.z_t$ as the expected increment in earnings, adjusted for expected earnings forgone due to the distribution of dividends. And, just like residual earnings, for a savings account $z_t = 0$, regardless of the dividends. More generally, one sees that under two reasonable assumptions, $\partial ear_{t+1} / \partial d_t = -r$ and $\partial ear_t / \partial d_t = 0$, does not depend on the dividend policy.

This framework would seem to be much more attractive that the RIV formula in that it focuses on next-period expected earnings, and their subsequent growth (adjusted for dividends) consistent with *analysts'* view of the world. We believe that RIV will never achieve the status of a premier valuation framework because it focuses, in essence, on the current book value and its subsequent growth as expressed by $z_t = bv_t + d_t - R.bv_{t-1}$. Earnings and their growth is the name of the game, not book values and their growth. It is really that simple!

4. A Parameterized Version of the Abnormal Earnings Growth Model

The formula related to earnings becomes more powerful if one adds an assumption. Specifically, consider:

$$z_{t+1} = \gamma z_t, \ t \geq 1$$

where $\gamma \geq 1$ is some presumed growth parameter. The dynamic must also presume some initialization $z_1 > 0$. The case $z_1 = 0$ is of modest interest since it follows that $P_0 = ear_{t+1} / r$.

With these assumptions in place one obtains a formula that expresses value in terms of:

- eps_1: Next-year expected or "forward eps."
- Year 2 vs. Year 1 growth (STG) in expected eps.
- A measure of long-term growth (LTG) in expected eps.
- Discount factor which reflects risk (Cost of Equity Capital).

Thus the investors' vision of the future is given by:

Some reasonably straightforward algebra results in the valuation formula

$$P_0 = \frac{eps_1}{r} \times \left[\frac{g_s - g_L}{r - g_L} \right]$$

where

r = cost of capital

$$g_s = \frac{eps_2 - eps_1}{eps_1} + \frac{r \times dps_1}{eps_1}$$

and

$$g_L = \frac{eps_t - eps_{t-1}}{eps_{t-1}} \quad \text{as} \quad t \to \infty \quad \text{(assuming full payout)}$$

Note that the correction to the short-term growth in eps, namely the term $r \times dps_1 / eps_1$ is typically small compared to $\Delta eps_2 / eps_1$. This term reflects the foregone year 2 earnings due to the distribution of wealth at the end of year 1.

In the very long run one can expect all firms to be identical. Hence, one can reasonably suggest that g_L is the same for all firms and the quantity will approximate the steady state growth of GNP such as 3-4%.

Every valuation formula leads to the familiar problem that the discount factor is not a "known quantity." Because of this somewhat grim reality, practical analysis engages in "reverse engineering." That is, one can take the current equity value, P_0, as a given and

solve for r. In the present case one obtains the following square root formula:

$$r = A + \sqrt{A^2 + \frac{eps_1}{P_0} \times \left(\frac{\Delta eps_2}{eps_1} - (\gamma - 1) \right)}$$

where

$$A \equiv \frac{1}{2}\left(\gamma - 1 + \frac{dps_1}{P_0} \right)$$

and

$$1 \leq \gamma < R$$

I believe this formula will be useful in practice and research. Specifically, serves as an indicator of the following possibilities:

(i) A firm's risk
(ii) An indication that eps_1 is not what the market really believes in pricing the security. That is if r is high - which makes the stock look "cheap" - then, eps_1 will be revised downward in the near future
(iii) A firm's equity is mispriced and thus it potentially leads to an attractive investment opportunity.

More generally, I note that the valuation approach that focuses on earnings and their subsequent expected growth has a number of attractive features. Simple assumptions result in a formula expressing value as a function of four variables: (i) next year estimated *eps* (ii) short term *eps* growth (iii) long term *eps* growth and (iv) cost of capital. The valuation formula is easy to implement using *eps* forecasts. The valuation implies that P_0 / eps_1 increases if (i) short-term *eps* growth increases (ii) long-term *eps* growth increase and (iii) the cost-of-capital decreases. The valuation formula allows short-term *eps* growth to exceed cost-of-capital. The valuation formula is consistent with the fact that the P_0 / eps_1 ratio generally exceeds the inverse of the cost-of-capital. The "square-root" formula derives a firm's expected market return; it depends only on (i) P_0 / eps_1, (ii) the dps_1 / P_0 ratio, (iii) short-term *eps* growth and, (iv) long-term *eps* growth.

A New Evaluation Method of Interaction Effects Using Compound Added Functions and the Analysis on its Relationship to the Attributes of Potential Customers

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ABSTRACT

At the 2004 SAVE Conference, the authors have proposed a method for evaluating the interaction effects produced by compounding added functions monetarily using the 3 indices of the amount of the interaction effects: the ratio of the interaction effects, and the rate of recognizing the interaction effects, and clarified its usefulness. In this study, they further analyze the difference in the scale of effectiveness of interaction effects caused by attribute differences of potential customers, and clarify the relationship between the attributes of potential customers and the interaction effects. They demonstrate that leveraging the relationship between the potential users and the interaction effects can help calculate predicted selling price, which is the key to establish a strategic product concept-making, a standard selling price and a target cost.

Keywords: evaluation method, interaction effects, added functions

1. Introduction

The objects of this study are the many existing durable consumer goods among competing products. Although their general sales prices are fundamentally determined from their relative supplies and demands, they are basically determined by adding strategic elements to the forecasted sales prices by evaluating the functions (include the basic and attractive functions) of similar product categories. However, studies on evaluations of added functions for product differentiation are still immature, and sufficient theoretical developments have not been made. This study pays attention to these added functions, especially to the effects of compounding the added functions, and examines the method for evaluating and utilizing them.

Here, a concept of "negative compounded effects" has been newly presented in addition to the positive compounded effects which are the results of contemporary studies (Harada and Tanaka [2001a]). These studies utilize the interaction effects, which are produced by the compounding of added functions to the setting of the sales prices or the utilization to the structuring of the added functions in the initial stages of new product developments. They have been integrated to be proposed as the amounts of the interaction effects, the ratios of the amounts of the interaction effects, and the rates of recognizing the interaction effects and have clarified how to utilize them.

Through a clear understanding of the relationship between customer attributes and

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scale of interaction effects of added functions, potential customers can be easily segmented. Also, it is possible to make a product concept incorporating the most strategic added function for each segment.

2. The Steps of a Preceding Study and This Study

We had proposed the method for evaluating the individual added functions of potential customers using the linear method for integrating information (Harada and Tanaka [2001b]). And the existence of a positive compound function by the compounding of added functions has been clarified (Harada and Tanaka [2001a]). However, nothing has been touched upon concerning negative compound effects.

There exist many negative compound effects as well as positive effects, so this study grasps the compounding of both as compound effects, and considers their effective utilization at the initial stage of new product development.

As the steps for this study, we first investigated the actual state of selected particular added functions and measured the amount of the function evaluations of the added functions concerned. Next, a new technique has been proposed for measuring and evaluating these positive and negative effects from 3 points of view (the monetary amounts of the interaction effects, the ratio of the amounts of the interaction effects, and the rates of recognizing the interaction effects) by the compounding of the added functions, and considers clarifying its effectiveness.

3. The Method for this Study

3.1 The Selection of the Particular Product and Functions

The particular product taken up in this study was considered to be a mature product, and had numerous competing products, and many added functions for product differentiation. To be more specific, it was a domestic kitchenware with the following 3 added functions. The 1st level added function was "add heat to the food material" and improvements were made to the contemporary methods to a higher level. The 2nd added function was "ease cleaning" which was a lower level function of "suck up smoke", and improves the function level of contemporary methods to a higher level. The 3rd was "wash and dry tableware" and was a new added function. The exterior view and special features of the structure materializing this product and added functions are as shown in Figure 1 (from documents furnished by the manufacturer).

3.2 The Method for the Investigation of the Actual Situation: 2 Point Evaluation Method

We used the 2 point evaluation method in which we presented a monetary value a (amount to be purchased) up to which we surely are willing to pay, and a monetary value b (the amount not to be purchased) above which we surely are willing not to pay. The form is as shown in Figure 2.

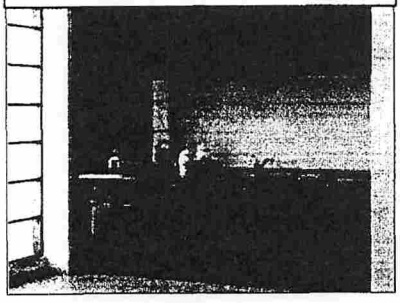
As mentioned above, we can avoid, by using the 2 point evaluation method, hesitating to evaluate monetarily or to present an extremely low evaluation amount thinking that this will help purchase at as low a price as possible. It is assumed here that the evaluation value of a particular potential customer is evenly distributed. Therefore,

the relation between the probability density of the amount of evaluation of the potential customers and the purchasing will for this amount can be shown as in Figure 3.

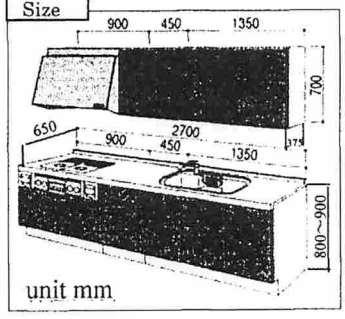
Figure 1 - The Structure of a Particular Product and Added Functions

The exterior view of a standard kitchenware of I type

Layout: I type
(Straight type as in the photograph)

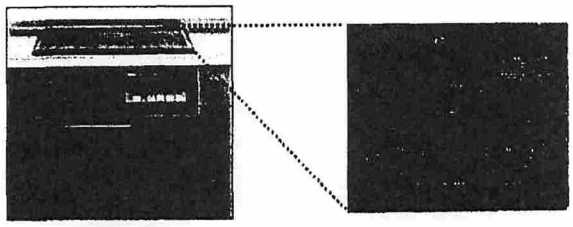


Size



Width: 2700 mm
Depth: 650 mm
Ordinary folding door
Ordinary range hood

Added function 1 (Add heat to the food material)



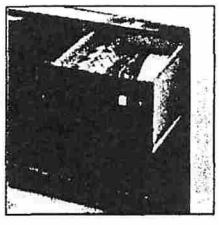
<Special features of the IH cooking heater>
- Aspects regarding safety, such as the prevention of empty heating are substantial.
- The plate plane is flat so cleaning is easy and it looks carefree.
- The cooking time is shortened by the good heat efficiency.
- The cost of electricity is about the same as that of gas.

Added function 2 (Ease cleaning)

<The special feature of the range hood easy to clean>
- It is easy to remove oil stains by wiping with water.
- The front cover can be easily opened, and it is easy to clean and remove the filter.
- It looks carefree.

The size was similar

Added function 3 (Wash and dry dinnerware)



Width: 448 mm
Depth: 595 mm
Height: 450mm

<The special features of the dinnerware washer and dryer>
- Washes and dries dinnerware automatically
- Can put in and out dinnerware with an easy posture without bending forward.
- Has a water-saving effect (about 1/5 the amount of water used when washing by hand)
- Rinses with hot water 80 degrees centigrade, and so is sanitary.
- Has some cost of electricity.

Figure 2 - Investigation Form for the 2 Point Evaluation Method

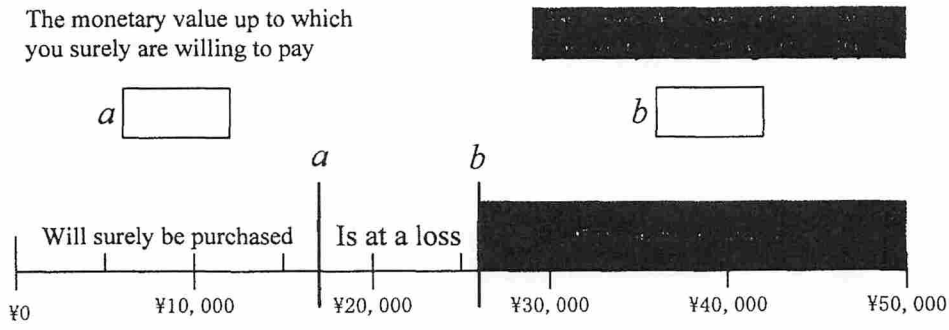
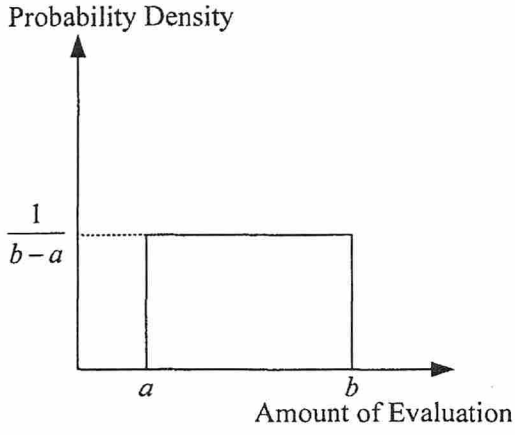
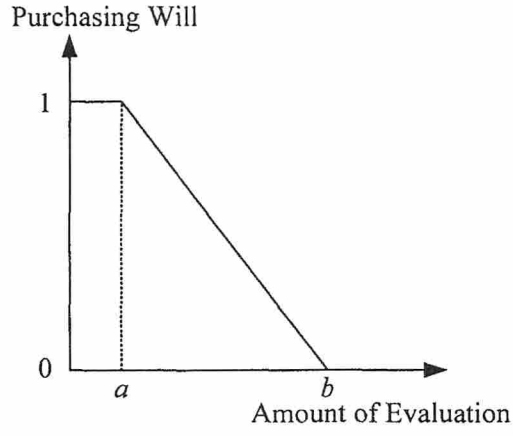


Figure 3 - The Relation Between the Amount of Evaluation and the Purchasing Will of Individual Potential Customers



The Probability Density Function of the Amount of Evaluation



The Relation Between the Amount of Evaluation and the Purchaising Will

Furthermore, we asked for answers by using the following questioning form to grasp the amount of evaluation of the interaction effects by compounding the added functions.

1st, 2 point evaluation was carried out for standard kitchenware and its individual added functions.

2ndly, evaluation was carried out collectively for the standard kitchenware with all the 3 added functions mentioned above added (will be called a high function kitchenware).

3rdly, a particular added function X was removed and substituted by a function of a contemporary level and evaluated collectively.

4thly, 2 particular added functions X and Y were removed and substituted by functions of contemporary levels and evaluated collectively.

5thly, 3 particular added functions X, Y and Z were removed and substituted by functions of contemporary levels (actually a standard kitchenware) and evaluated collectively.

An internet homepage was used for this investigation for housewives of 20 to 40 years old. And 128 effective answers were obtained.

Figure 4 - Negative Interaction Effect

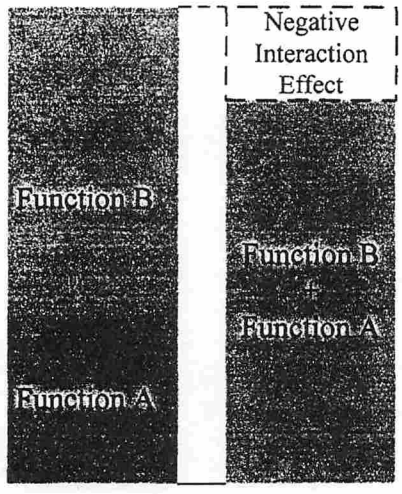
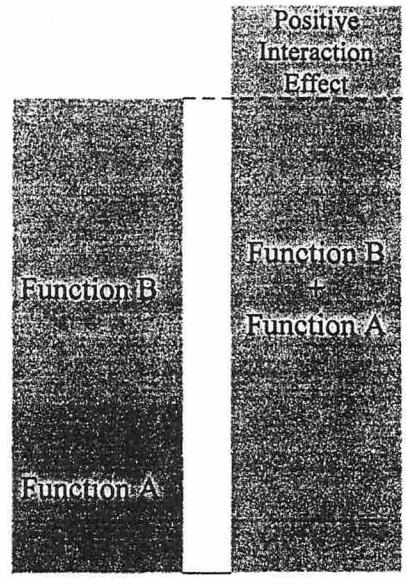


Figure 5 - Positive Interaction Effect



4. The Method of Evaluating Interaction effects by Compounding Added Functions

4.1 The Definition of Positive Interaction Effects and Negative Interaction Effects

When plural added functions are combined and included in a new product, it has been made clear by a preceding study (Tanaka and Okuhara and Hirose [2004]) that some kind of interaction effects (compounded effects) can be seen. "Positive interaction effects" mean that new functions that can be recognized as useful by potential customers are produced as multiple effects.

However, we wish to pay attention here that potential customers are diverse, and there exists not only potential customers who recognize positive interaction effects, but many who do not. According to the preceding study mentioned above, when two added functions are compounded and evaluated collectively, about 70% of the potential customers tend to evaluate lower than the sum of the evaluations of the 2 individual added functions. As one of the reasons for this, it is observed that the evaluations are made by the potential customers by considering the reduction of cost by compounding the added functions.

This phenomenon is called the "negative interaction effect" in this study. The conceptual figure of these 2 interaction effects can be shown as in Figures 4 and 5.

4.2 The Method for Evaluating Interaction Effects by Using Simple Averages

4.2.1 The Method for Calculating the Monetary Amount of Interaction Effects

Here, we will mention the method for calculating the monetary amount of interaction effects which are indices showing the magnitude of the interaction effects which potential customers feel when added functions are compounded.

The preceding study mentioned above clearly showed the method for calculating the

monetary amount of positive interaction effects (compounded effects) from the relation between the sum of the monetary evaluated amount of the added functions and the purchasing. This should be called the strict method, and can be said to be a reasonable method for grasping the positive interaction effects of individual potential customers. However, when looked at from a practical business point of view, this method uses the epitomization of uniform distributions and grasps the monetary amount of interaction effects as areas, so the procedure of calculation becomes somewhat complex (Tanaka and Okuhara and Hirose [2004]).

So, a simplified method of obtaing the simple averages of the amounts of interaction effects was utilized in this paper. The reason was that there were no large differences among the evaluated amounts by the strict method and the simplified method so it was considered that the simplified method was considered to be allowable. (the simplified method will be unsatisfactory if there are significant differences).

The method for evaluating the interaction effects by the simplified method is as follows. The interaction effects in case of compounding 2 functions will be mentioned. Let the amount evaluated for the added function 1 mentioned above by the potential customer i be (a_{i1},b_{i1}), for the added function 2 mentioned above be (a_{i2},b_{i2}) and the collective amount for the compounded added functions 1 and 2 be (a_i, b_i), then the amount of interaction effects Z by the potential customer i for the 2 functions can be expressed as follows.

$$Z_i = \frac{a_i + b_i}{2} - \left(\frac{a_{i1} + b_{i1}}{2} + \frac{a_{i2} + b_{i2}}{2}\right) \tag{1}$$

When $Z \geqq 0$, it can be considered that the potential customers have recognized positive interaction effects, while on the contrary when $Z < 0$, it can be considered that the potential customers have recognized negative interaction effects.

For example, when a potential customer has evaluated a much higher level function for the function "give heat to the food materials" so as to become (¥50,000,¥150,000), and for the function "wash and dry dinnerware" as (¥100,000,¥150,000), and evaluated the combination of the 2 added functions as (¥250,000,¥300,000), then this potential customer can be considered as evaluating a positive interaction effect of ¥50,000 from Equation (1).

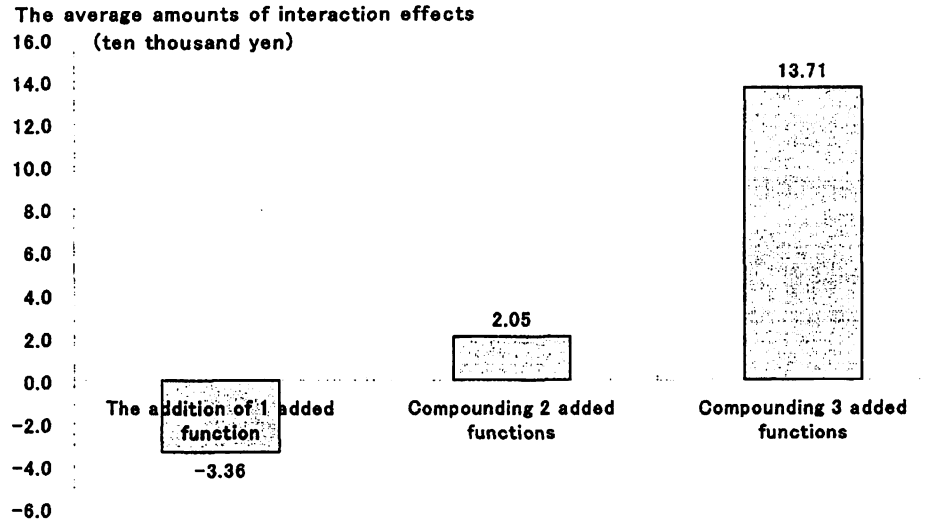
As can be seen from above, we can obtain the amount of the average interaction effect Z for a total of n potential customers concerning food processing from Equation (2).

$$Z = \sum_{i=1}^{n} \frac{Z_i}{n} \tag{2}$$

In the applied example, when the average amounts of interaction effects are obtained for the addition of 1 added function, and the compounding of 2 added functions and 3 added functions, the result became as in Figure 6.

The positive interaction effects for compounding the 3 added functions, that is all the 3 added functions are added, appear very conspicuously in Figure 7. On the other hand, the amount for the average amount of interaction effects by the addition of 1 added

Figure 6 - The Average Amount of Interaction Effects in This Case Study



function show a negative value. This is probably because the potential customers feel that the evaluation decreases largely as the added functions are removed 1 by 1 from the amount of situation (?) in which all the added functions are complete (a high function kitchenware).

Furthermore, when a histogram showing the frequency of the amount of the interaction effects are made from a particular range in the amount of evaluation (a range of ¥500,000 for the applied case study) using the amount interaction effects for individual potential customers actually surveyed, the distribution of the amount of interaction effects can be grasped visually. Figure 7-9 show the histograms for the distributions of the amounts of interaction effects for the cases of adding 1 added function, and the e of 2 and 3 added functions.

As the number of added functions decrease from the compounding of 3 added functions to the compounding of 2 added functions and further to the addition of 1 added function, it can be seen that the axis of the distribution tends to shift to the left (the amounts of the interaction effects become smaller).

Calculating the amounts of interaction effects in such an analysis shows in concrete terms the desirable degree of the compounding of the added functions. So they become useful information for decision-making in strategic sales pricing and strategic added function structuring.

4.2.2 The Method for Calculating the Monetary Amount Ratio of the Interaction Effects

The monetary amounts of the interaction effects are important indices for grasping the interaction effects of the potential customers, but there are variations in the evaluated amounts of the potential customers themselves and there can also be seen rather large differences in the amounts of the interaction effects. So an index to compare and analyze them becomes necessary. A new index called the monetary amount ratio of

Figure 7 - The Histogram for Compounding 3 Added Functions

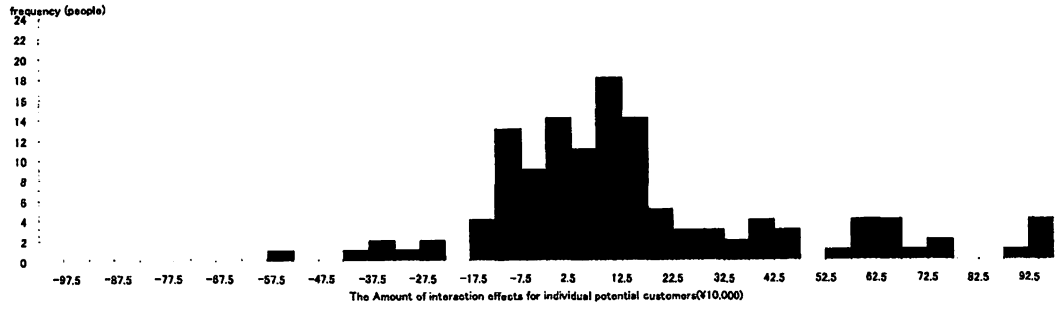


Figure 8 - The Histogram for Compounding 2 Added Functions

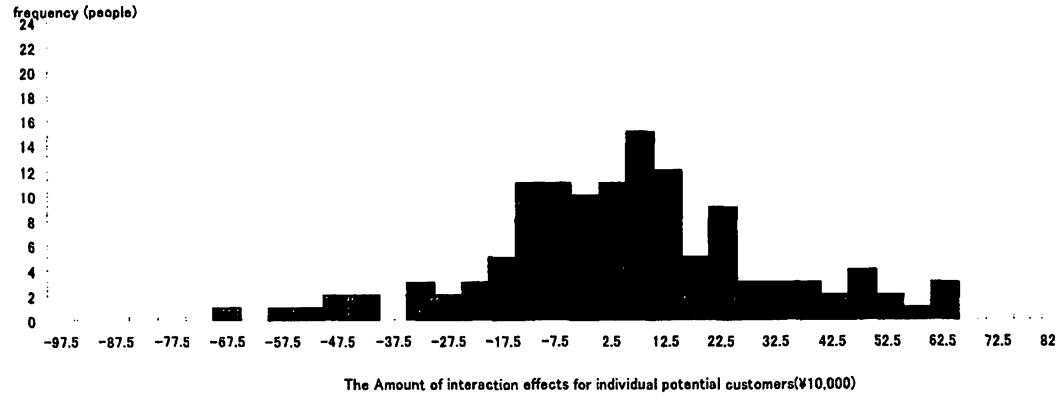
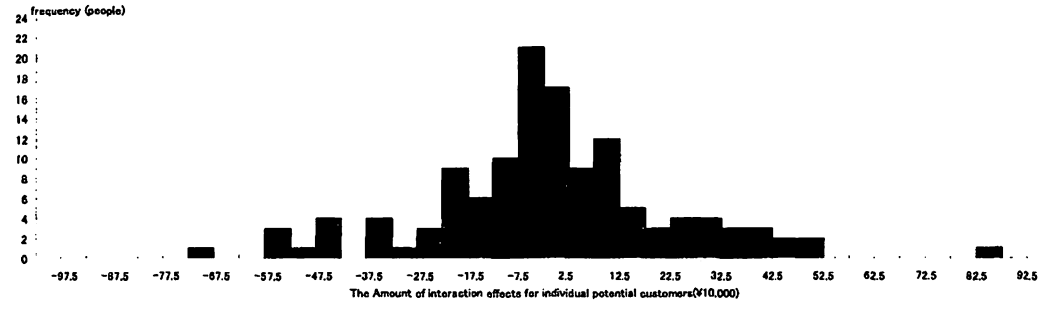
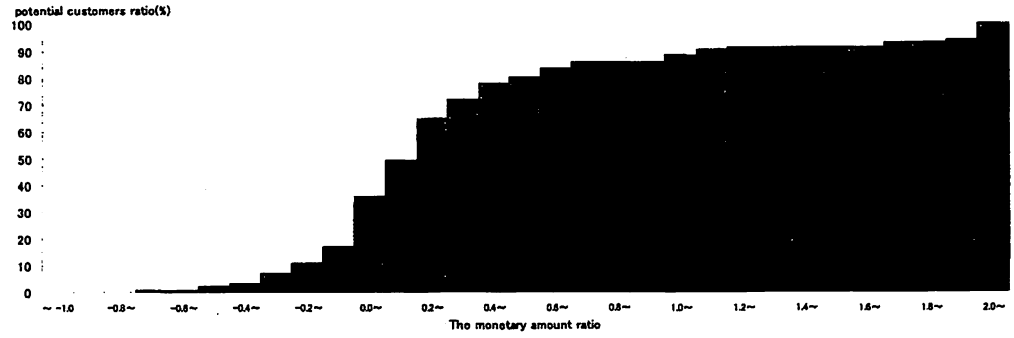


Figure 9 - The Histogram for the Addition of 1 Added Function



the interaction effects was devised in this study as the index. This shows the ratio between the amount ratio of the sum of the individual evaluations of plural added functions by particular potential customers and the afore-mentioned monetary amounts of the interaction effects. When this is measured and analyzed for individual potential customers or all the potential customers investigated a more effective utilization of the interaction effects can be done.

Figure 10 - The Cumulative Distribution
of the Monetary Amount Ratio When 3 Added Functions are Compounded



Let us explain this by providing an example of the compounding of 2 functions. Let the evaluated amount for the added function 1 of the potential customer i be (a_{i1},b_{i1}), and the evaluated amount for the added function 2 of the potential customer i be (a_{i2},b_{i2}), and the amount ratio of the interaction effects Z_i, then the monetary amount ratio of the interaction effects can be expressed by the following Equation (3).

$$r_i = \frac{Z_i}{\frac{a_{i1}+b_{i1}}{2}+\frac{a_{i2}+b_{i2}}{2}} \tag{3}$$

By calculating the monetary amount ratios of the interaction effects, it is possible to grasp the monetary amounts of the positive and negative interaction effects of the individual potential customers as their ratios to the total amount of individual evaluated values by compounding the added functions.

For example, when a potential customer evaluated individually a much higher level for a much improved function level of "heat food materials" as (¥50,000, ¥150,000), and for "wash and dry dinnerware" as (¥100,000, ¥150,000), and as (¥250,000, ¥300,000) for the combination of the 2 functions, then this potential customer has recognized a positive interaction effect of ¥50,000, so the monetary amount ratio of the interaction effects becoms 0.22 from Equation (3).

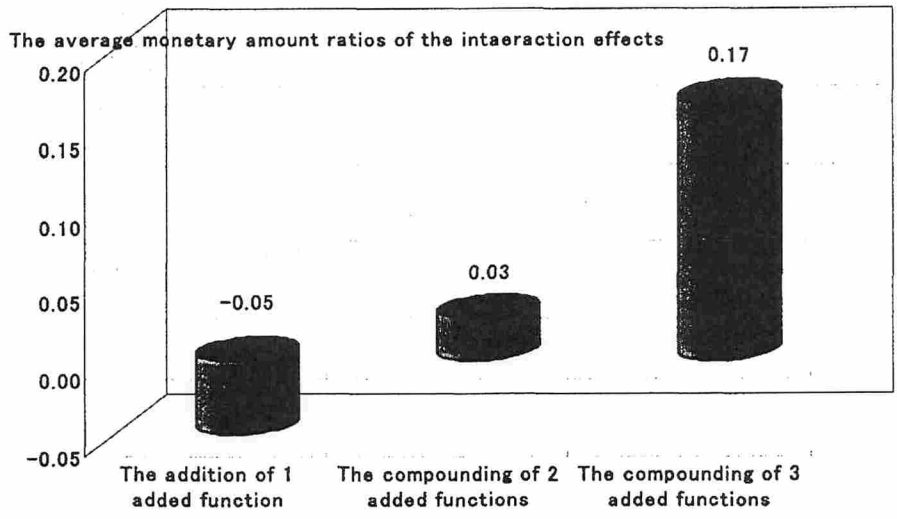
When a potential customer has recognized negative interaction effects, the monetary amount ratio of the interaction effects will of course take a negative value.

While the monetary amounts of the interaction effects express the magnitude of the monetary amounts, the monetary amount ratios express the degrees of the interaction effects.

Figure 10 shows the cumulative distribution of the monetary amount ratio calculated for individual potential customers.when the added functions are compounded.

Potential customers are concentrated near -0.2 - 0.2. This means that the monetary amounts of the interaction effects recognized by the potential customers are about 20% larger than the values evaluated individually for the respective added functions for both

Figure 11 - The Average Monetary Amount Ratios of the Interaction Effects for the Addition of 1 Added Function, and the Compounding of 2 and 3 Added Functions



positive and negative, and it becomes necessary to utilize this in setting the strategic sales price, etc.

Furthermore, if we utilize this way of thinking to the whole potential customers who have answered effectively, it will be possible to calculate the average monetary amount ratios. The average monetary amount ratio R is expressed by the following Equation (4).

$$R = \frac{\sum_{i=1}^{n} Z_i}{\sum_{i=1}^{n} \left(\frac{a_{i1} + b_{i1}}{2} + \frac{a_{i2} + b_{i2}}{2} \right)} \tag{4}$$

By calculating the average monetary amount ratio R, the ratio of the interaction effects to the evaluated amount of all potential customers investigated. When the average monetary amount ratios are shown for the addition of 1 added function, and the compounding of 2 and 3 added functions, they become as shown in Figure 11.

From Figure 11, it can be seen that for the average monetary amount ratios of the interaction effects for the investigated potential customers as a whole, an approximately 17% positive average monetary amount of the interaction effects have been recognized for the total evaluated values of the individual added functions when the 3 added functions are compounded. And it can be seen that negative interaction effects of about 5% has been produced.

4.2.3 The Calculation of the Recognized Ratios of the Interaction Effects

Next, it is also necessary to know how many potential customers among all the potential customers who answered effectively will show how large monetary amount ratios of the interaction effects. The index to express this will be called the recognized

ratio of the interaction effects. This will be shown as the ratio of the potential customers ($r_i \geq 0$) who showed positive interaction function ratios to the whole potential customers who answered effectively.

The L will be shown as follows.

$$L = \frac{n_{r_i \geq o}}{n} \tag{5}$$

where

$n_{r_i \geq 0}$: number of potential customers ($r_i \geq 0$)

n : number of whole potential customers who answered effectively

When the recognized ratio of the interaction effects are calculated for an addition of 1 added function, and the compounding of 2 and 3 added functions, they are as shown in Figure 12.

Figure 12 - The Recognized Ratio of the Interaction Effects for the Addition of 1 Added Function, and the Compounding of 2 and 3 Added Functions

	The Recognized Ratio of the Interaction effects
The addition of 1 added function	0.38
The compounding of 2 added functions	0.52
The compounding of 3 added functions	0.64

When the number of added functions to be compounded becomes small, the recognized ratio of the interaction effects seems to decrease but the rate seems to be small. This is a very important point, and even for the case of adding 1 added function, 38% of the potential customers recognize positive interaction effects. By utilizing face sheets, etc., it will become possible to set profitable sales prices and added function structures against competing companies if it is possible to specify the potential customers of which segment recognize positive interaction effects even for small numbers of added functions.

5. An Overall Consideration of the Analysis of the Interaction Effects and the Applied Case Example

Detailed evaluations of the kitchenware were carried out by the face sheet used in the investigation of the actual situation. The contents of the face seat are as follows.

Q1 Married or Single
Q2 Kind of residence
c1: House of my name
c2: House of family name

c3: Housing Corporation's apartment
c4: Rental luxury apartment
c5: Rental apartment
c6: Company house
c7: Others

Q3 Kind of occupation
c1: Company employee
c2: Independent enterprise
c3: Civil servant c4: Student
c5: Housewife
c6: Others

Q4 Actual age

Q5 Area of kitchen
c1: 3.09m^2 or less
c2: 3.09-6.09m^2 or less
c3:6.19-9.29m^2 or less
c4: 9.29-12.39m^2 or less
c5:12.39-15.48m^2 or less
c6: 15.48m^2 or more

Q6 Satisfaction to area of kitchen
c1: Very satisfaction
c2: Satisfaction
c3: Usually
c4: Dissatisfaction
c5: Very Dissatisfaction

Q7 Satisfaction to equipment of kitchen

Q8 Income
c1: ¥2,000,000 or less
c2: ¥2,000,000 ~ ¥4,000,000 or less
c3: ¥4,000,000 ~ ¥6,000,000 or less
c4: ¥6,000,000 ~ ¥8,000,000 or less
c5: ¥8,000,000 ~ ¥10,000,000 or less
c6: ¥10,000,000 ~ ¥12,000,000 or less
c7: ¥12,000,000 ~ ¥15,000,000 or less
c8: ¥15,000,000 or more

Q9 Age

Q10 Number of people of families

5.1 Analysis of Relation between Amount of Interaction Effect and Potential Customer

The data obtained by the surveys are analyzed by multiple regression analysis, and which items influenced the amount of interaction effect is clarified.

Table 1 shows which items influence the amount of interaction effect.

Income and age influences the effect of three kinds of amount of interaction. The kind of occupation, the area of kitchen and the number family members influence both the amount of interaction effect of 1 added function and 2 added functions. The kind of the residence influences only the amount of interaction effect of 3 added functions. The satisfaction for kitchen equipment influences only the amount of 1 added functions

Table 2-4 show the results of multiple regression analysis.

Table 1 - Item that Influence Amount of Interaction Effect

contents of the face seat	1 added	2 added	3 added
Q1 Married or Single			
Q2 Kind of Residence			○
Q3 Kind of Occupation	○	○	
Q4 Actual Age			
Q5 Area of Kitchen	○	○	
Q6 Satisfaction to Area of Kitchen			
Q7 Satisfaction to Equipment of Kitchen		○	
Q8 Income	○	○	○
Q9 Age	○	○	○
Q10 Number of People in Families	○	○	

Table 2 - Multiple Regression Analysis Results Predicting 1 Added Function

name of predictor variable	regression coefficient						
Constant	-5.12						
kind of occupation	c1	c2	c3	c4	c5	c6	
	0.00	-38.62	-3.95	8.22	5.87	8.83	
area of kitchen	c1	c2	c3	c4	c5	c6	
	0.00	1.11	4.64	-7.89	17.45	-18.05	
Income	c1	c2	c3	c4	c5	c6	c7
	0.00	9.627	14.33	10.89	26.28	10.07	36.45
Age	-0.83						
number of people in families	2.73						

Coefficient of determinant R^2=0.212

Table 3 - Multiple Regression Analysis Results Predicting 2 Added Function

name of predictor variable	regression coefficient						
Constant	-37.52						
kind of occupation	c1	c2	c3	c4	c5	c6	
	0.00	-49.39	13.21	27.98	2.71	13.95	
area of kitchen	c1	c2	c3	c4	c5	c6	
	0.00	10.12	14.07	3.22	33.80	-15.96	
satisfaction to equipment of kitchen	c1	c2	c3	c4	c5		
	0.00	27.55	4.44	16.86	22.62		
Income	c1	c2	c3	c4	c5	c6	c7
	0.00	25.05	24.75	19.37	38.84	22.93	46.34
Age	-0.80						
number of people in families	3.21						

Coefficient of determinant R^2=0.277

Table 4 - Multiple Regression Analysis Results Predicting 3 Added Function

name of predictor variable	regression coefficient						
Constant	0.34						
kind of residence	c1	c2	c3	c4	c5	c6	c7
	0.00	15.44	20.48	-7.18	16.81	5.78	-28.71
Income	c1	c2	c3	c4	c5	c6	c7
	0.00	21.75	33.64	32.28	44.34	28.29	57.16
Age	-0.87						

Coefficient of determinant R^2=0.175

The expected value of amount of interaction effect of 1 added function is ¥-1.84, if the kind of residence is "house of my name" and kind of occupation is "housewife" and area of kitchen is "6.19 m^2" and satisfaction to equipment of kitchen is "satisfactory" and income is "¥6,000,000" and age is "35 years" and number of people in family is "4".

$$\hat{y} = -5.12 + 5.87 + 4.64 + 10.90 - 0.83 \times 35 + 2.73 \times 4 = -1.84$$

It calculates similarly. The expected value of amount of interaction effect of 2 added function is ¥11.03.

$$\hat{y} = -37.52 + 2.72 + 14.07 + 27.55 + 19.37 - 0.80 \times 35 + 3.21 \times 4 = 11.03$$

The expected value of amount of interaction effect of 2 added function is ¥2.17.

$$\hat{y} = 0.34 + 0.00 + 32.28 - 0.87 \times 35 = 2.17$$

5.2 Considerations on This Case Example

The following can be said as the considerations from the result of analyzing the investigated potential customers as a whole or according to age and income. What is common throughout is that the compounding of 3 added functions show very large positive interaction effects for the amounts and the recognition rates of the interaction effects. This probably is, of course, due to the generation of a new added function by the compounding of two added functions. It may also be considered that the potential customers giving effective answers greatly recognize the effect of the addition of all these added functions, that is, a system effect. Therefore, manufacturers should recognize this point and clarify what customers should be the target, and set the strategic sales price and the structuring of the added functions. Furthermore, the amount of the interaction effect became predictable by the customer's condition or needs.

6. Conclusions

This study pays attention the added functions, especially compounded added functions, utilized often as differentiating strategies against competing products and has proposed a new evaluating method clarifying its usefulness. That is, referring to the method of evaluating the positive interaction effects, as clarified in the preceding study, the way of considering negative interaction effects has been clarified, and these have been unified into the 3 indices: the monetary amounts of interaction effects, the interaction effect ratio, and the recognition rate of the interaction effects. These were made to be helpful in setting the strategic sales price or structuring the added functions during the initial stage of new product development by utilizing them to fit the purpose. The main points are the following 3:

First is to calculate and utilize the monetary amount of the interaction effects by compounding the added functions. This makes it possible to grasp monetarily the interaction effects incorporated into the product in mind by compounding the added

functions, so if we segment the targeted potential customers, then this can be utilized to set the sales prices of the added functions, the structuring of the added functions, or the setting of the target cost which are acceptable to them.

Secondly, by calculating the ratio of the monetary amount of the interaction effects, the ratio, not the monetary amounts of the interaction effects, can be measured for the segmented potential customer groups (target). If these ratios can be known, they will become useful information in additional strategies for added functions or the setting of the sales prices, etc.

Finally, it will become possible to predict the amount of interaction effects so that the target becomes clear, and they can be utilized in setting the sales prices and the target costs during the making of the product concept.

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Integrated Management Control System for Small and Medium Sized Enterprises

Toyohiko Hachiya* and Pablo Gonzalo Ramirez*

ABSTRACT

Nowadays the role of SMEs in national economies is widely recognized. However, due to its limited resources availability, especially the lack of capital, SMEs have no margin for mistakes. The leading objective of this study is to develop a management control system to provide SMEs a resource to address its lack of information for decision-making purposes. The research proposal contributes to determine the volume and mix of core business by the integration of Theory of Constrains (TOC), Activity Based Costing (ABC) and Economic Value Added (EVA™). The election of management tools relies on its potential to address the profitability when considering a multiple product and limited resource environment. Results confirm that the integrated management system provide insights into the mix that leads to the maximization of the firms economic profit with respect to the trade-offs among resources deployed and constraints faced by the firms.

Keywords: control system; ABC; TOC; EVA; SMEs

1. Introduction

The role of Small and Medium Sized Enterprises (SMEs) in a national economy is well known, considering their contribution to the total Gross National Product and employment. Mitchell and Reid (2000) stated that despite its economic importance and the considerable attention afforded, researching management accounting in the small firm setting has never been fashionable. However, Dilts (1989) suggests that the range of strategic options is considerably narrow by necessity, since SMEs have insufficient resources to compete effectively. Sophisticated and costly strategies are often precluded by the lack of specialized expertise, capital and personnel necessary to their implementation. Moreover, the above-mentioned limitation means that managers at SMEs have little margin for mistakes and misjudgments and the use of financial management tools can enable them to make more efficient and practical use of their scarce resources. The main objective of this work is to suggest a management control system that provides accurately and timely information for decision-making purposes in the context of SMEs. The suggested management control system would help SMEs with the evaluation of its core business by means of integration of Economic Value Added (EVA™), Activity Based Costing (ABC) and Theory of Constrains. In order to assess the robustness of the proposed system we evaluate whether the benefits of the integrated system (scenario 4-5 respectively) surpass the benefits of grouping the same tools in pairs (scenario 1-2-3 respectively) using scenario analysis.

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The subsequent objective of this study is to investigate how SMEs could incorporate concepts originally developed for large firms in their decision making process.
This work provides an overview of three management tools as well as prior works where tools were combined. Then, it presents the benefits of the proposed model; and its implementation in a case study.

Finally, we summarize the findings of this work and offer conclusions.

2. TOC, ABC and EVA

Management control was defined by Anthony (1965) as the process by which managers make sure that resources are obtained and used effectively and efficiently in the accomplishment of the organization's objectives. Primarily management control system was designed to support the firm strategy, matching organizational structure and environment. Nowadays firms are facing new challenges associated with global competition and dynamic markets. Under these circumstances, many firms are increasingly using management tools in order to deal with accuracy in product cost, pricing, production, and investments decisions.

The integration of TOC and ABC had been problematic, since these two theories are considered simultaneously as incompatible and complementary to each other. However, Holmen (1995) pointed out that ABC and TOC are based on different time horizons; ABC has a long-term horizon while TOC has a short run. Along this line, Spoede et al. also (1994) state that ABC generates accurate data to support the TOC process. Cooper and Slagmulder (1999) suggest that TOC - ABC combination is useful when the resource supply is limited.

On the other hand, Goldratt (1990) claims that ABC was designed to control product distortions, and that tool does not address the profitability side, the most important problem in the firm's decision making. Corbett (2000) insinuates that the debate should not be centered in the short versus long-term issue, but instead has to be focused on the type of constraints.

The combination of effects between ABC and EVA have also been documented by Hubbell Jr. (1996) who argues that the integration provides managers a corporate system that improves the process of managing both cost and capital. Anctil et al. (1998) provides evidence of how the combination helps to identify residual income, as well as improving opportunities for outsourcing and unprofitable product's identification. However, the combination of TOC-EVA as well as the combination of TOC-ABC-EVA has neither been well documented nor field-tested.

3. Linking TOC, ABC and EVA

The study consisted of two main steps: first, the management's tools at SMEs were modeled and implemented. Then, outputs among the three-management tool integrated system were evaluated instead of grouping them in pairs using scenario analysis.
According to TOC literature, making money is the primary reason for a company to exist, which in terms of Goldratt is represented by throughput (throughput is a concept coined by Goldratt, Eli in The Haystack Syndrome Chapter 4) accounting measure

(selling price minus cost of raw material and components). However, we decided to use primarily EVA as decision criterion to judge each management integrated system regarding its capability to determine the product mix that leads to the maximization of firm's economic profit. We shift from throughput accounting to EVA, because the first subsumes the second, which accounts for absolute amount of surplus value over and above the resources deployed (we rely on throughput accounting when EVA is not available). It is also remarkable that resource usage complements the clear-cut selection criteria as a source of information regarding constrained resources.

This study also introduces a variation in EVA's calculation, which adds to the traditional weighted average cost of capital (WACC) procedure. The EVA calculation, which uses only the cost of debt, was introduced to gain detailed information regarding product's interest expenses coverage capacity. It also yields detailed information about the capacity to finance its growth in the future.

According to the well-documented lack of resources and knowledge expertise, implementation was adopted to SME's needs and resources. The individual implementations of TOC, ABC and EVA were done using an inexpensive and reasonable available resource such as Microsoft Excel and Excel Solver.

3.1 Background of the Firm

We applied the proposed management control system in a glass-manufacturing firm, with annual sales of approximately $5,000,000 capital size of $4,000,000 and 13 employees in 5 identifiable areas: warehousing, production, marketing, delivering, and general and administrative.

The firm provided three different types of products for three different client categories: construction firms (large firms), department stores (big chains), furniture firms and small retailers.

The products, here on named P1, P2 and P3 (all of them), had experienced increase in demand in the last two years. Indeed the firm was using its full time production capacity in order to deliver the products orders. Additional investments in equipment as well as hiring new personnel were out of options in the short term.

3.1.1 Modeling and Implementation of TOC

In the context of deciding how to exploit internal and external firm's constraints, three elements were considered: demand, machine time requirements, and throughput accounting per product.

The optimal products mix was calculated as follows:

$$\text{Maximize } Z = \sum_{i=1}^{3} z_i x_i \leq M \qquad (1)$$

$$\text{Subject to } \quad 0 \leq x_i \leq D_i \quad i = 1,\ldots,3$$

As shown in the equation, Z is the maximization of firm's throughput accounting; z_i is the throughput accounting per unit of product i; x_i number of unit per product i to be produced; m_i machine time requirements in minutes per unit of product i; M total machine time availability.

D_i and zero represent the upper and lower bounds respectively, over the number of units of product *i* and are determined from forecast of demand.

It should be noted that for simplicity of representation, single constraints for each machine usage were shown.

3.1.2 Modeling and Implementation of ABC

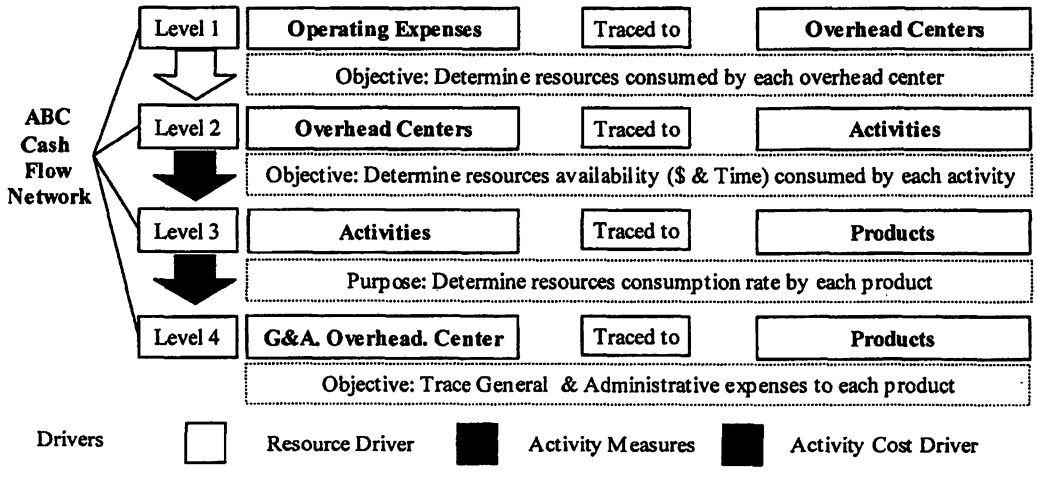
The implementation of ABC was done according to three critical factors a) the capacity of the resources supplied which was acquired in advance independent of its usage related to current production volume and mix; b) the cost of supplying an hour of productive time and c) the time required to perform each activity (Cooper and Kaplan, 1998).

The operational system's data was used as critical inputs in the working out of an ABC network to the following ends:

1. To calculate committed capacity at each overhead center, as well as overhead centers' labor-hour cost.
2. To calculate resource consumption pattern per activities per product in terms of hours.
3. To determine excess or shortage of capacity at each overhead center in terms of hours.
4. To calculate standard cost rates per product.

Figure 1 gives the implementation steps.

Figure 1 - Activity Cash Flow Network Levels



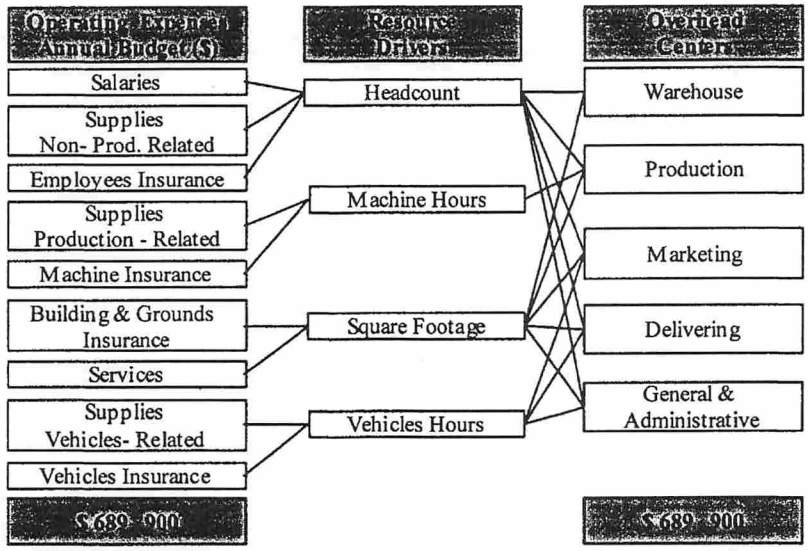
As a first step, committed capacity was set as a function of the costs of resources directly attributable to the specific overhead center according to its resource consumption patterns.

Using resource drivers cost, the firm's operating expenses were grouped in terms of resource driver cost pools and then traced to each of the five overhead centers

mentioned before. For instance in figure 2, headcount grouped the annual cost of payroll, employee's insurance and supplies non-production related, from the left to the center. Then the cost of resources (cost pool) was traced to overhead centers by using a resource driver rate (percentage of employee per center in the case of headcount).

At the second step, the total labor hours available in conjunction with the time required to perform each activity was calculated in order to evaluate used and unused human resource capacity at each center. The activities performed at each center were measured in terms of labor hours required by each product demand. Measurement was done through "activity drivers." Those drivers are units of measure to represent an activity volume.

Figure 2 - Resource Drivers



Types of measures used were a combination of frequency, duration, and physical measures. Table 1 shows activities as well as the drivers used to evaluate activity labor-hours' resource consumption pattern per product at each center.

Table 1 - Activity Measures at production overhead center

Activities	Cost Classification	Activity Measures
Machine attendance	Batch	Machine operator ratio - Production time per batch
Machine setups	Batch	Number of setups - Setup Time per batch
Assembly	Unit	Assembly time per product
Handling final product to warehouse	Batch	Handling time per batch

The excess or shortage capacity of different product mix was evaluated by confronting labor hour's (demanded and available) per product.
For instance, the implementation of results obtained at production overhead center is

expressed as the following function:

$$p = 0.3114ma + 0.3109ms + 0.3603as + 0.174h \leq 10,400, \quad (2)$$

where p represents production overhead center and ma, ms, as, h represent activities, machine attendance, machine setups, assembly, handling respectively, and 10,400 represent the total annual labor hours available for the mentioned center. In addition, the activities analysis per product allowed the identification of resource consumption pattern per activities per product (driver rates in term of labor hours demanded by each specific product), as follows;

$$ma = 0.4697\ P1 + 2.0666\ P2 + 4.2166\ P3 \leq 3,238.56 \quad (3)$$

$$ms = 0.9628\ P1 + 2.128\ P2 + 2.584\ P3 \leq 3,232.92 \quad (4)$$

$$as = 1\ P1 + 2\ P2 + 4\ P3 \leq 3,747.38 \quad (5)$$

$$h = 0.0512\ P1 + 0.1\ P2 + 0.18\ P3 \leq 181.25, \quad (6)$$

where P1, P2 and P3 represent each product's quantities.

Through this procedure we estimated labor hours needed to deliver total annual sales orders per product. Then overhead centers' cost were traced to products according to labor-hours resource consumption patterns..

3.1.3 Modeling and Implementation of EVA

Most of the information needed to calculate EVA could be obtained from firm's financial statements (Income Statement and Balance Sheet). The implementation required the calculation of total and per product's net operating profits after taxes (NOPAT), capital charges, and cost of capital.

Due to the identification of used and unused capacity, NOPAT reflected the costs of idle capacity and NOPAT per products were not penalized by excess capacity, reflecting products true contribution.

According to EVA's procedures, the firm's operating capital could be calculated by the estimation of total net fixed assets plus net working capital (Bennett Stewart III, 1991). Hubbell (1996) suggests that in order to look for improvements opportunities, management has to analyze each business process (products) capital cost.

The identification of capital charges per product was carried out in two steps. First, each item of the balance sheet was associated with an activity that demands the assets (ABC rationale). Afterwards activities driver rates per products (Identified by ABC analysis) were used to trace capital charges to products.

In addition, the same procedure used to identify capital charges per product was used to trace depreciation as well as interest expenses. Moreover, fixed assets resource usage pattern (property & land, equipment, and other assets) by products was used as proxy to allocate the capital charges of mentioned accounts.

The calculation of capital charges rate was the major challenge to be faced in order to implement EVA procedures due to the lack of external information (market risk

premium and betas) regarding SMEs context. For SMEs, since betas are not published, a comparable firm methodology was used to estimate the firm's beta. In addition, weighted average beta was estimated in order to avoid differences in capital investment risk per product. Finally, market risk premium was approached through small firm publicly stocks and the risk free rate with long-term government bonds.

The EVA calculation was done in two steps, first by subtracting from NOPAT the cost of debt only (EVA 1) and second, by subtracting the weighted-average cost of capital (WACC), (EVA 2). The two steps EVA calculation accurately reflect financial as well as operational leverage per product allowing the firm to set priorities regarding market development, pricing, and process improvement policies.

4. Scenarios

At the first scenario, the firm integrated ABC-EVA into its strategic planning; the underlying assumption was that the firm continued producing as it had been doing during the last years. At the second scenario, the firm integrated TOC-ABC and it was assumed that the integration answered to firm's decision to evaluate its constraints as well as resource usage. At the third scenario, the firm integrated TOC-EVA; the assumption was that the firm decided to evaluate its product portfolio as well as its economic profit. At the fourth scenario, the firm decided to evaluate its performance through an integrated management control system that comprises TOC-ABC-EVA in order to evaluate product portfolio, resources expenses committed and capital deployed. At the fifth scenario, the integrated management control system incorporated human resources constraints identified in the production center through the ABC cash flow. The five scenarios are summarized in Table 2.

Table 2 - Scenarios analysis

Integration	ABC EVA	TOC-ABC	TOC EVA	TOC-ABC-EVA	TOC-ABC-EVA
Scenario	1	2	3	4	5
Setting	Historical levels	Optimal Level			Optimal Level
Assumption	Historical levels	Machine Constraints Demand Constraints			Machine Constraints Demand Constrains Labor Hours Constraints
Product 1 (units)	80,000	77,760			95,000
Product 2 (units)	30,000	34,500			23,919
Product 3 (units)	20,000	25,000			19,983
Throughput Accounting ($)	2,930,000	3,187,180			3,047,346
NOPAT ($)	1,061,672	1,215,980			1,132,080
EVA ($)	239,958	n/a	353,250	353,250	302,102
Resource usage ($)	637,014	708,716	n/a	708,716	635,024
Spread (ROI - COC) (%)	6.54%	n/a	9.17%	9.17%	8.15%
Resource usage ratio (%)	92.33%	102.72%	n/a	102.72%	92.04%

4.1 Scenario 1 ABC - EVA Combination

By this integration, identification of product's resource consumption pattern helps managers to identify constrained resources, as well as accurate information regarding

products' costs. The explicit information regarding excess capacity (excess of resources committed) allowed the system to reflect the products' profitability without penalization due to the inclusion of unused capacity.

Indeed, this combination is unable to deliver the maximum EVA according to resources deployed (Scenarios 3, 4 and 5 outdo this scenario (higher EVA), and also the scenario 2 (higher Throughput accounting, the alternative selection criteria when model do not present EVA). Despite positive benefits of ABC-EVA combination, it did not provide insights related to what products and in which quantities the firm should produce in order to become more profitable.

4.2 Scenario 2 TOC - ABC Combination

The most important contribution of TOC-ABC combination is related to the potential identification of new constraints, giving management insights about resource usage and short-long term resource adjustment.

Resource adjustment depends on the firm's ability and capacity to compensate shortage or excess capacity among centers internally gaining more efficiently resource usage and consequently improving its profitability. On the other hand, inability to reorganize resources allowed the manager to recalculate optimal mix with the introduction of identified constraints.

Even if the integrated TOC-ABC system was useful when the firm presented machine and human resources constraints, the system did not address neither the firm nor the products' value creation (EVA, EVA per product, the clear-cut selection criteria).

4.3 Scenario 3 TOC - EVA Combination

With TOC-EVA combination, the decision-maker achieves a full comprehension about short-term profit maximization and profitability. In this regard, if the firm could not create value even if exploiting its constraints, it would indicate that the firm must evaluate its product portfolio, market potential, demand elasticity as well as processes improvements.

Even if this combination met our first selection criteria, this system could send wrong signals to decision makers. The system does not identify constrained resources (specifically human resources) and consequently the firm's inability to deliver the product's mix. Moreover, without the identification of resource consumption patterns per product, capital charges could not be traced to products, looking at total EVA instead of a complete picture that include EVA per product, in this regard the three tools integrated system outperform TOC-EVA system.

4.4. Scenario 4 TOC - ABC - EVA Combination

The integrated management control system provides the decision-maker with accurate information not only at the firm but also at product levels. In this regard, specific actions at operational and strategic levels could be undertaken in order to improve firm and product performance as well.

Due to integration of ABC, two aspects related to overhead center could be identified: availability and capacity measured in terms of labor hours. As shown in table 3 at historical production levels (ABC-EVA scenario 1), resources deployed at production and commercialization centers present no excess capacity, whereas at distribution and warehousing centers present almost 25 % excess capacity. This excess capacity in terms

of hours represented 500 hours at each department annually.

By the integration of TOC (Scenario 2 to 4), the firm exploits its constraints (demand and machine time) switching the production from mix 1 to mix 2. However, increased profitability would be possible only whenever labor hours among centers could be reorganized.

In the short-run, if reorganization among centers were possible this should lead to "favorable" over-utilization (resource usage ratio 103%) of capacity (Cooper and Kaplan, 1992). However, if labor hours among centers could not be reorganized in the short-run, because special training is required to upgrade employee's skills, the integrated system (scenario 4) shows labor hours at production center as a new additional constraint (for simplicity we assume commercialization centers labor hours shortage are reorganized). In this particular, the integrated system (as pointed out before, ABC generates information to support the TOC process) provides accurate information to support management decisions in order to look for a new alternative mix of product (which lead us to setting up scenario 5).

Table 3 - Overhead center capacity usage

Overhead Center	Production	Warehousing	Customer	Distribution	G&A	Capacity usage ratio
Scenario 1	97%	72%	100%	78%	100%	92%
Scenario 2	110%	81%	108%	88%	100%	103%
Scenario 3	97%	71%	104%	78%	100%	93%

4.5 Scenario 5 TOC - ABC - EVA Combination

The new solution placed more emphasis on P1 rather than in P2 and P3 because product P1 demanded less labor hours (the constrained resource) at production overhead centers. After analyzing the three proposed mixes, we visualized that labor hours at production overhead center were a potential constrained resource, whereas excess labor hours' capacity at warehouse and delivering centers were confirmed, no matter the proposed mix (table 3). The new results show the robustness of the system proposed; if the firm could reorganize (labor hours among centers) itself (scenario 4) the firm creates more EVA than historical production levels (scenario 1). However, if reorganization is not possible the integrated system updated with the identified constrain delivers an alternative mix that also outperform scenario 1.

Indeed the integrated system has additional advantage over grouping them in pairs (scenario 1-2-3), allowing managers to estimate not only EVA but also EVA per products achieving more insights about products' profitability. The changes in volume sold per product affected the firm's throughput accounting as well as the products' economic profit. As shown in table 4, at historical levels mix 1, the most profitable product was P1, followed by product P2 and P3 respectively. P1 presented the smallest contribution margin, the highest sale volume, and a resource consumption of only 34% over the total used resources. At the same time estimates of capital employed, directly attributable to the product represented 31% of the total capital employed by the firm. In the light of the results, P1 presented the highest return on capital invested (55%), becoming the firm's largest wealth creator, with positive EVA (1, 2).

P2 contribution margin was greater than P1, although the sale volume reach less than

40% P1's sales volume, therefore P2 contributed with 26% of the total gross profit. In addition, P2 presents positive EVA (1, 2).

Finally P3, in spite of its highest contribution margin (100% more than P1), the contribution to total gross profit reaches only 25% due to the smallest sales volume compared to other products. Additionally, P3 presented the highest resource consumption pattern (35%) and capital employed (40%) consequently for P3 EVA (1, 2) became negative, showing P3 inability to cover interest expenses as well as its capacity to create value respectively.

In addition, if reorganization were possible (mix 2), EVA per product analysis showed that if 25% increased in sales volume by P3 could be achieved, EVA 1 turns from negative to positive. However, volume was not enough to cover the total cost of capital (EVA 2). It is highly remarkable that despite the decrease in products A's volume sold, increase in EVA (1, 2) was achieved due to decrease in capital employed (decrease in inventories stock and account receivables attributable to P1).

By the integration of labor hour's constraints at production center (Scenario 5), changes in volume sold per product showed that P2 became a wealth destroyer, as the result of its negative spread between return on capital and the weighted-average cost of capital. Even so, P2 did not lose its interest coverage capacity. P3 presented negative EVA (1) and EVA (2).

Results obtained through integrated management control system (scenario 5) suggest a potential excess of capital investment attributable to P2 and P3. The findings present a starting point for, in depth analysis, including potential market growth and pricing, as well as inventory and receivables policies.

Table 4 - Economic profit per product

	Product	Units	EVA (1)	EVA (2)
Scenario 1	1	80,000	473,748.23	374,595.02
	2	30,000	112,942.06	25,414.75
	3	20,000	-1,781.14	-128,320.07
Scenario 4	1	77,760	486,716.09	401,084.28
	2	34,500	138,808.75	40,222.46
	3	25,000	59,463.56	-76,441.51
Scenario 5	1	95,000	609,353.95	508,589.29
	2	23,918	43,859.88	-44,007.40
	3	19,983	-3,997.32	-131,734.87

5. Discussion

The results obtained suggest that the implementation of three-management tools in SMEs can not only be accomplished satisfactorily, but also surpass the benefits of grouping them in pairs.

The proposed control system ascertains profit contribution variance between historical firm behavior and optimal product mix regarding important elements like constraints and resources committed.

The scenario analysis shows that implementation in pairs subsume to the integrated system (scenario 4 or 5) presenting the following shortcomings:

a) ABC-EVA combination does not provide signals related to what products or quantities the firm should produce to become more profitable.
b) By the combination of TOC-ABC the system is not capable to provide evidence of value creation as well as genuine product profitability.
c) TOC-EVA system does not identify causal relationships between resources committed, activities performed, and volume produced. That is why it does not address the firm's lack of resources and consequently it is unable to provide signals regarding possible productions targets.

6. Conclusions

The objective of developing the integrated system was to provide SMEs a resource to address its lack of information for decision-making purposes in order to evaluate the performance regarding its product portfolio. The election of three management tools relies on its potential to address the profitability analysis when considering a multiple product and limited resource environment. In this regard, scenario analysis confirms that the integrated management system delivers insights about the mix that leads to the maximum EVA possible, according to the trade-off among firms' resources deployed and their constraints. The integration of TOC into the management control system helps firms to focus on their short-term regarding cash generation and liquidity. In the middle-long run, ABC and EVA integration helps managers to identify areas where improvements are workable. ABC-EVA provides managers with insights into their costs and capital charges per product by the identification of idle or shortage capacity which shows areas where inefficient resources could be cut or reorganized. Identification of resources consumed at product levels provides managers with real information regarding trade off among assets, expenses and profitability of individual products. The limitation of the present work is related with the difficulty of applying the management control system freely to all SMEs. Because there is a gap into the nature of every enterprise, it is necessary to adapt the proposed tool and tailor it to each firm behavior.

Additionally the model does not incorporate non-financial strategic control measures (lead-time, quality, and customer satisfaction) that are critical to a firm's success.

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Effects of Advertising and R&D on the Intangible Assets for the Japanese Manufacturing Firms: A Panel Data Analysis

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ABSTRACT

This paper analyzes the effects of advertising and R&D expenditures on the values of intangibles for the 382 Japanese manufacturing firms for 12 years from 1990 to 2001. The advertising and R&D expenditures significantly increase the value of intangibles only for 25% of the firms, but for the other 75% neither the advertising nor R&D expenditure increases the value of intangibles. This finding suggests the inappropriateness of imposing an identical relationship over all the firms. We also demonstrate that the accounting data for our analysis exhibits a panel structure with cross-section and time series properties, which leads to apply a generalized least squares (GLS) method of estimation to the regression model instead of conventional ordinary least squares. To our knowledge, there has never been previous analysis applying the GLS method to the time series data. This method is potentially applicable to many problems in the field of accounting.

Keywords: intangibles, R&D, advertising, market valuation, panel data

1. Introduction

A considerable number of studies on intangible assets have been made in both the U.S. and Japan in the recent years. The Brookings Task Force on Intangibles published a report in Blair and Wallman (2001), which emphasized the importance of intangible assets. The Corporate Legal System Study Group in the Ministry of Economy, Trade and Industry (2002) proposed a method of valuing brand assets for the Japanese firms. See Hirose (2002) for summary of the report. Lev and Zarowin (1999) clarified that the reported earnings, cash flows, and book (equity) values have been losing usefulness over the past 20 years because the business environments were drastically changed by R&D and other factors. Barth and Clinch (1998) examined the relationship between the revalued intangible assets and the share prices. Barth et. al (1998) and Kerin and Sethuraman (1998) empirically studied on the brand values. Sougiannis (1994), Lev and Sougiannis (1996), Chan, Lakonishok and Sougiannis (2001) and Aboody and Lev (1998) made empirical researches on the R&D. Lev (2001) reviewed empirical studies about the intangible assets for the U.S. firms. All of these empirical studies have contributed to disseminate the proposition that intangible assets of a firm raise its corporate value.

On the other hand, although there are many discussions about intangible assets in Japan, most of these arguments do not have empirical evidences. There are very few empirical studies that focus on the intangible assets except for the recent works by Ito and Kagaya (2001) and Sakurai and Ishimitsu (2004). Ito and Kagaya (2001)

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demonstrated that the resource of a corporate value in the Japanese firms had shifted from tangible assets to intangible assets mainly based on descriptive statistics. Sakurai and Ishimitsu (2004) found that the brand value is positively correlated to the stock price. They estimated the brand value by a method originally proposed by the Corporate Legal System Study Group.

The accounting data typically comprises a panel structure with both cross-section and time series properties. In other words the accounting data are obtained by observing the activities of many firms over the multiple periods of time. Most empirical studies in the field of accounting so far carried out in the U.S. as well as Japan have only taken account of the cross-section properties of the data but ignored the time series properties. In fact, all the empirical studies referred above from the U.S and Japanese literatures are based on the cross-section analysis. They do not fully consider time series properties of the data. This kind of treatment of data is not correct from a statistical point of view.

The purpose of this paper is twofold. First, the paper extends the issue proposed by Ito and Kagaya (2001). We examine how much advertising and R&D expenditures of a firm raises the value of intangible assets for the Japanese manufacturing firms listed on the first- and second sections of the Tokyo Stock Exchange market from the periods of 1990 to 2001. The intangible assets consist of intellectual capital, brand equity, human capital and others. While Sakurai and Ishimitsu (2004) focused on the brand equity, which is one element of the intangibles, we are interested in the intangibles as a whole including, brand equity. The advertising and R&D expenditures are commonly regarded as most important factors for determining intangible assets. Second, we employ a statistical method, which explicitly incorporates the panel data structure for analyzing the first problem unlike the previous researches, which ignore the time series properties of the data.

The empirical results reveal the two facts. (i) For the top 25% of the 382 firms examined in this paper, the advertising and R&D expenditures significantly increase the value of intangible assets, but for the other 75% neither the advertising nor R&D expenditure increases the value of intangible assets. This result suggests that it is not a wise strategy to impose an identical relationship among all firms, and we need to classify the firms into subgroups by some criterions when we analyze the intangible assets of the Japanese firms. (ii) The conventional method of statistical analysis is not justified for the accounting data we examined, instead we should use an appropriate method proposed in the paper.

This paper is organized as follows. Section 2 presents the theoretical framework and econometric model for analyzing the effects of advertising and R&D expenditures on the intangible assets. Section 3 discusses the data source and empirical findings for the Japanese manufacturing firms. Section 4 presents some concluding remarks.

2. The Model and an Econometric Formulation

2.1 The Model

This subsection discusses the theory for defining the intangible asset and determining the factors that affect the values of intangible assets based on Simon and Sullivan (1993). We decompose the corporate value (V^*) of a firm into the value of tangible assets including financial asset (TA) and the value of intangible assets (IA) as follows:

$$V^* = TA + IA \tag{1}$$

The V^* is also decomposed into the value of debt (DEBT) and the value of stock (STOCK).

$$V^* = DEBT + STOCK \tag{2}$$

From equations (1) and (2), the IA is defined as

$$IA = DEBT + STOCK - TA \tag{3}$$

We need the market value of IA for analyzing the effects of advertising and R&D expenditures. The DEBT, STOCK, and TA should be measured at the market values in order to be conformable to equation (3) if the IA is measured in terms of market value.

On the other hand, the IA of a firm are conceptually composed of intellectual capital, human capital, brand value and other factors which affect the corporate value but are not classified into intangible assets, i.e.,

$$IA = (\text{Intellectual Capital}) + (\text{Human Capital}) + (\text{Brand Value}) + (\text{Others}) \tag{4}$$

Intellectual capital should be increased in R&D. Human capital can be considered as a function of R&D and brand value since highly qualified researchers are willing to be employed by the firms with large R&D expenditures and high brand values. The brand value of a firm may depend on the quality of goods the firm produces and on the degree of recognition for goods by consumers. Hence, the brand value is a function of advertising and R&D expenditures. The above consideration suggests that advertising expenses and R&D expenditures are important factors for determining the value of IA. In other words, the value of IA is a function of advertising expenses (AD) and R&D expenditure (RD). Although the IA of a firm could be a complicated function of AD and RD, we approximate it by a linear function for simplicity of analysis:

$$IA \fallingdotseq \alpha + \beta_1 AD + \beta_2 RD \tag{5}$$

where α, β_1 and β_2 are coefficients of the function. We note that these coefficients possibly change over individual firms and over times if the relation in equation (5) of a firm differs over the firms and over times.

In addition to AD and RD, the variables such as patents and skills of an executive officer may contribute to the values of IA. Hence, equation (5) would not satisfy equality in an exact sense. For the empirical analysis, we add an error term to express the effects of all variables other than AD and RD as shown in equation (6).

2.2 An Econometric Formulation

This subsection provides the econometric model corresponding to equation (5) in order to analyze the effects of advertising and R&D expenditures on the values of intangible assets for the Japanese manufacturing firms listed on the first- and second sections of the Tokyo Stock Exchange market for 12 years during the periods of 1990

and 2001. The 382 firms are chosen by a certain criterion as will be stated in Section 3. We note the data set comprises a panel structure with cross-section and time series characteristics.

Equation (6) presents the effects of the AD and RD expenditures of a firm on the values of the IA of its own firm. It is often said that the outcome from the AD and RD expenditures are less stable than that of the expenditures for tangible assets. The firm having advanced management skills for the advertising and R&D activities can bear more fruit than the firms with less advanced skills. Then, the firms with advanced skills may result in the high levels of intangible assets compared with the firms with less advanced skills. If we take account of this consideration, it is not a wise strategy to impose an identical β_1 and β_2 over all the firms. Rather we had better classify the firms into some groups so that the firms within the same group possess common β_1 and β_2, while the firms among different groups are allowed to have different β_1 and β_2. Although we should classify the firms having the same level of management skill for advertising and R&D activities into the identical group, it is impossible to do so in practice without knowing β_1 and β_2 in advance.

Instead, we classify the firms into J equally sized groups according to the magnitudes of the intangible assets each firm possesses on the average over the sampling periods. Let IA_{it} denote the rate of intangible assets to the total amounts of sales for the i-*th* firm at time t, calculate the average values $G_i = (1/T)\sum_{t=1}^{T} IA_{it}$, and arrange G_i's in an ascending order of magnitude as G(1)< ・ ・ ・< G(382), where G(i) denote the i-*th* smallest average IA among $\{G_1,\ldots, G_{382}\}$. The j-th group consists of 382/J firms with the values of average IA from G((1/J)382(j-1) + 1) through G(382j/J) (j = 1,...,J). For example, the first group are made of G(1) through G(382/J). The number of J will be determined in Section 3.

Taking account of the panel data structure and the group structure simultaneously, the econometric model is formulated as follows:

$$IA_{ijt} = \alpha_{jt} + \beta_{1j} AD_{ijt} + \beta_{2j} RD_{ijt} + \varepsilon_{ijt} \qquad (6)$$

$$i = 1,\ldots, I_j; \quad j = 1,\ldots,J; \quad t = 1,\ldots,T,$$

where

IA_{ijt} = the rate of intangible assets to the total sales for the i-*th* firm in the j-*th* group at time t,

AD_{ijt} = the rate of advertisings to the total sales for the i-*th* firm in the j-*th* group at time t,

RD_{ijt} = the rate of R&D to the total sales for the i-*th* firm in the j-*th* group at time t.

The error terms are assumed to have normal distributions with the covariances:

$$E\{\varepsilon_{ijs}\ \varepsilon_{ijt}\} = \sigma_{st}; E\{\varepsilon_{hjt}\ \varepsilon_{ijt}\} = 0, (h \neq i); \text{and } E\{\varepsilon_{iht}\varepsilon_{ijt}\} = 0, (h \neq i) \quad (7)$$

Each firm has possibly non-zero autocorrelations but their values are identical over all the firms, and there exists no covariance between different firms neither within nor

without group. The error terms of the i-*th* firm have a multivariate normal distribution:

$$\varepsilon_{ij.}=\begin{pmatrix}\varepsilon_{ij1}\\ \vdots\\ \varepsilon_{ijT}\end{pmatrix}\sim N(\mathbf{0},\ \Sigma),\quad \Sigma=\begin{pmatrix}\sigma_{11} & \cdots & \sigma_{1T}\\ \vdots & \ddots & \vdots\\ \sigma_{T1} & \cdots & \sigma_{TT}\end{pmatrix} \tag{8}$$

The unknown parameters to be estimated in this model are α_{jt}, β_{1j}, β_{2j} and σ_{st}, the total number of parameters are $J\times T+2J+(1/2)T(T+1)$.

Not only the current amounts of expenditures for AD and RD but also the accumulated amounts from their past expenditures may have the effects on the values of IA. The effects of AD and RD on IA will persist for several periods. We have to add the variables for measuring the accumulated amounts of AD and RD, the lagged ADs and the lagged RDs, to equation (6) in order to incorporate the above effects. However, we confine our attention only to the current effects of AD and RD in this paper.

The econometric model of (6) and (7) is quite general, and some explanations about the properties of the model are in order. First we note that the constant term (α_{jt}) varies over both the groups and times, and picks up the effects of each group and of each time on the level of IA, although this term is not main interest in this paper.

Second, the coefficients of AD and RD are respectively denoted by β_{1j}, β_{2j}. They possibly differ among different groups. In other words, the effects of AD and RD on the IA can take different values from one group to another. We will test the hypothesis of equality of β_{1j} and β_{2j} among all groups:

$$\begin{aligned}&H_0: \beta_{k1}=\cdots=\beta_{kJ},\\ &\quad \text{vs.}\\ &H_1: \beta_{kh}\neq\beta_{kj} \text{ for at least one pair of (h, j), (k =1, 2)}\end{aligned} \tag{9}$$

If the null hypothesis (H_0) is accepted, the coefficients β_{kj} are identical for all groups. In this case we do not need to classify the firms into different groups. On the other hand, if the null hypothesis (H_0) is rejected, the coefficients β_{kj} are different among some groups. In the latter case the classification of the firms into different groups is justified.

Third, concerning the structure of the covariance matrix Σ, our model includes the case

$$\Sigma=\sigma^2\mathbf{I}_T \tag{10}$$

where $\mathbf{I}_T$ is a $T\times T$ unit matrix as a special case, which in turn implies that the error terms of each firm have no autocorrelation. Empirical researches by standard literatures in the field of accounting typically employ this formulation of equation (10) for the covariance matrix in error terms, and routinely apply the ordinary least squares (OLS) method to estimate the unknown parameters. However, the accounting data with panel structure of cross-section and time series properties is not likely to satisfy equation (10). If we apply the OLS to the model by carelessly assuming equation (10) when the true covariance is in equation (8), the parameters cannot be efficiently estimated. It is important to correctly specify the covariance structure of the error terms and to employ

an appropriate estimation method in practice. Hence, we should test the hypothesis

$$H_0 : \Sigma = \sigma^2 \mathbf{I}_T, \quad \text{vs} \quad H_1: \Sigma \neq \sigma^2 \mathbf{I}_T \tag{11}$$

If the null hypothesis is accepted, error terms of each firm do not have autocorrelations. In this case the use of the OLS method is justified. On the other hand, if the null hypothesis is rejected, the error terms do have autocorrelations.[1] We should use the generalized least square (GLS) method of estimation instead of the OLS. In fact, we apply a feasible generalized least square (FGLS) method for estimating the model of (6) and (7). The estimation method and testing procedures are explained in Appendix.

Assumption (7) excludes the co-movements of error terms among different firms either within or without group. This assumption may not reflect the real world of stock markets since many stock prices often fluctuate simultaneously towards the same direction. However, if we allow the covariance between different firms, we have to estimate too many parameters because we have large number of firms. It is not meaningful formulation to take account of possible covariance structure between firms for the purpose of this paper.

3. Empirical Study for the Japanese Manufacturing Firms

3.1 Data Source and Descriptive Statistics

The data sources for this study are "NIKKEI NEEDS - CD-ROM Financial Statement (Nikkei, 2002)," "The Stock Prices CD-ROM(Toyo Keizai Inc., 2001)," and "NIKKEI Kaisha Jhouhou (2002-III, Summer) (Nikkei, 2002)." We select the firms satisfying all the following eight conditions: (a) Belong to manufacturing industry; (b) Listed on the first- or second sections of the Tokyo Stock Exchange in the year of 2001; (c) Financial data is consecutively available from 1987 (the base year to estimate a replacement value) to 2001; (d) The closing date of the every fiscal year from 1987 to 2001 is on

[1] The first-order autoregressive model is often used to formulate the time-series properties of error terms: $\varepsilon_{ijt} = \rho\, \varepsilon_{ijt-1} + \xi_{ijt}$, where ξ_{ijt} follows a white noise process $N(0, \sigma^2)$. Then, the covariance matrix has a specified form

$$\Sigma = \sigma^2 \begin{pmatrix} 1 & \rho & \rho^2 & \cdots & \rho^{T-1} \\ \rho & 1 & \rho & \cdots & \rho^{T-2} \\ \rho^2 & \rho & 1 & \cdots & \rho^{T-3} \\ \vdots & \vdots & \vdots & \ddots & \vdots \\ \rho^{T-1} & \rho^{T-2} & \rho^{T-3} & \cdots & 1 \end{pmatrix},$$

with only two unknown parameters. This model can save a considerable number of parameters compared with the model of equation (8) in which the number of unknown parameters are $T(T+1)/2$ (= 78, if T = 12). Since the accounting data typically consists of large number of firms (M = 382 in this paper), we can allow an unspecified structure of Σ. This phenomenon is an advantage for analyzing the accounting data.

Table 1 - Number of Firms.

Industry \ Group	(1) Very Low	(2) Low	(3) High	(4) Very High	sum
Mining	2	0	0	0	2
Oil & CoalProducts	2	0	0	0	2
Pulp & Paper	2	1	0	0	3
Shipbuilding	0	0	3	0	3
Rubber Products	1	1	1	1	4
Glass & Ceramics Products	2	4	0	4	10
Other Products	2	6	1	1	10
Textiles & Apparels	2	4	0	4	10
Other Transportation Equipment	2	5	2	1	10
Iron & Steel	10	2	3	0	15
Pharmaceutical	1	2	1	14	18
Precision Instruments	2	6	4	5	17
Foods	9	7	3	2	21
Automobile	10	10	1	1	22
Nonferrous Metals	8	6	9	5	28
Construction	7	14	19	2	42
Chemicals	15	14	11	4	44
Machinery	15	6	15	15	51
Electric Appliances	4	7	23	36	70
sum	96	95	96	95	382

Note: Industry classification follows that of NEEDS.

March 31; (e) Have neither increased nor reduced capital during 1987 and 2001; (f) Have not made merger & acquisition with any listed companies during 1987 and 2001; (g) Have disclosed both advertising costs and development & experimental research expenses every year from 1989 to 2001; and (h) Stock prices are consecutively available from 1990 to 2001.

The number of firms satisfying the above conditions are M=382. The data set is made of balanced panel structure having 382 cross-section multiplied by twelve time-series from 1990 to 2001 (T=12). The total number of samples is N=382×12=4584. The 382 firms are classified into four groups (J=4) according to the criterion stated in Section 2.[2]

Although we want to ideally determine the market value of IA defined by equation (3), it is impossible in practice since the market values of the DEBT and TA are not available. As alternatives for their market values, we use DEBT measured by the book value and TA measured by the replacement value. Further, the replacement value of TA must be estimated because it cannot be directly observed. We employ the estimating method introduced by Hayashi and Inoue (1991) on the line of measuring Tobin's Q. The STOCK is measured by the average stock price in May of each year since the financial statements for most of the firms go public in May. The IA measured from the above procedure is standardized by total sales of a firm. The AD is measured by "advertising costs" divided by total sales. The RD is measured by "development expenses and experimental research expenses" divided by total sales.

[2] Although we do not report here, we have estimated the model with J = 5. The estimates of coefficients for the model do not hold the order of inequalities $\beta_{k1} < \beta_{k2} < \beta_{k3} < \beta_{k4} < \beta_{k5}$ for k=1, 2. We do not believe that the classification of firms into more than four groups provides any meaningful interpretations.

Table 2 - Descriptive Statistics.

Group	Variable	Mean (%)	Median (%)	Std. Dev. (%)	Min (%)	Max (%)
Total Samples	IA	6.34	-2.66	81.44	-335.19	965.84
N=4584	AD	0.80	0.26	1.65	0.002	25.33
	RD	2.11	0.99	2.82	0.002	20.62
(1) Very Low	IA	-52.48	-45.15	62.57	-335.19	330.50
N=1152	AD	0.65	0.16	1.28	0.004	11.43
	RD	1.61	0.76	2.27	0.002	18.19
(2) Low	IA	-9.08	-11.84	40.19	-190.46	266.76
N=1140	AD	0.74	0.22	1.24	0.003	7.14
	RD	1.45	0.64	2.14	0.004	16.17
(3) High	IA	14.03	10.68	43.49	-202.33	344.32
N=1152	AD	0.47	0.23	0.63	0.002	5.65
	RD	1.83	1.24	1.89	0.004	15.15
(4) Very High	IA	73.41	50.40	104.43	-109.94	965.84
N=1140	AD	1.35	0.51	2.63	0.003	25.33
	RD	3.54	2.06	3.97	0.002	20.62

Note: N = number of observations within group.

Some parts of advertising costs may be included in the manufacturing costs. Although a part of research and development costs was capitalized in the past, all of these costs are currently expensed. Therefore, AD and RD may contain the measurement errors. However, we can not recover the true advertising costs from the published statements. Fortunately, capitalized development expenses and experimental research expenses are negligible compared with the total development expenses and experimental research expenses. Then, we can ignore these expenses as has been done in Liu (2004).

Before conducting the formal analysis, we state some properties of the data based on summary statistics. Table 1 indicates the number of firms classified by group and industry. The firms in pharmaceutical and electric appliance industries mainly fall into the group 4. The values of intangible assets are high in these two industries.

Table 2 summarizes the descriptive statistics for the data set we use in the following analysis. The intangible assets for approximately half of the firms are negative, but those for the firms in the group 4 are highly positive.

Table 3 shows sample correlation coefficients among three variables (IA, AD and RD). The correlations on the groups1 through 3 are small in absolute value, while those on the group 4 are relatively high. This observation may suggest that the AD and RD significantly affects the value of IA in the group 4, but the effects of AD and RD on the values of IA are dubious in the groups 1 through 3.

3.2 Results

We report the estimating results for the Japanese manufacturing firms. Table 4 presents the estimates of coefficients of β_{kj}. (k=1, 2; j=1,...,4). The estimates of α_{kj} are not reported here because they are not main interest of this paper. We find from Table 4 the inequalities $\beta_{k1} < \beta_{k2} < \beta_{k3} < \beta_{k4}$, for k = 1 and 2. That is, the higher the intangible assets of the firms are, the higher the estimates of coefficients of both AD and RD are also. This finding is expected from the earlier discussion in Section 2. The estimates

Table 3 - Sample Correlation Coefficients among Variables

Group		IA	AD
Total Samples	AD	0.197	
	RD	0.240	0.297
(1) Very Low	AD	0.027	
	RD	-0.063	0.163
(2) Low	AD	0.026	
	RD	-0.028	0.146
(3) High	AD	0.050	
	RD	0.008	0.144
(4) Very High	AD	0.208	
	RD	0.238	0.337

of β_{14} and β_{24} only for the group 4 are significantly positive at 5% significance level, while all other estimates of β_{1j} and β_{2j} for the groups 1 through 3 are negative though not significant except in one case.

Table 4 - Estimates of Coefficients for Equation (6)

Variables \ Group	(1) Very Low	(2) Low	(3) High	(4) Very High
AD	-1.846	-0.418	-0.213	5.033
$\hat{\beta}_{1j}$	(-0.89)	(-0.20)	(-0.06)	(4.63)
RD	-3.435	-1.586	-0.564	1.779
$\hat{\beta}_{2j}$	(-2.97)	(-1.34)	(-0.45)	(2.63)

Note: The values in parentheses indicate t-values.

The results reveal that the expenditures for the advertising and the R&D contribute to increase the values of the intangible assets only for the firms in the group 4. On the other hand, the expenditures for the advertising and the R&D have no contribution to the intangible assets for the firms in the groups 1 through 3. This fact might be counter-intuitive because the AD and RD are generally considered to increase the intangible assets. However, it can be interpreted as follows. The investors judge that three quarters of the firms analyzed in the paper excessively spend their money to the advertising and R&D activities, so that the expenditures of these firms have no contribution to increase the IA.[3]

We formally test the equalities of coefficients for AD and RD. The Wald test explained in Appendix is applied for testing the equality of the coefficients of AD among groups, i.e., for testing the hypotheses (9) in Section 2. The test statistic indicates W=12.24 (degrees of freedom (d.f.) =3), rejecting the null hypotheses at the 1 % significance revel. That is, the coefficients of AD are different among the four groups.

[3] The effects of AD and RD on IA may vary from one industry to another. Though not reported here, we analyzed equation (6) with the category (j=1, 2,..., J) identifying the industry. We did not obtain any meaningful results.

Table 5 - Estimates of the Correlation Matrix

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000
1991	0.66										
1992	0.32	0.59									
1993	0.40	0.64	0.82								
1994	0.31	0.50	0.58	0.83							
1995	0.10	0.32	0.58	0.69	0.81						
1996	0.26	0.42	0.42	0.56	0.65	0.67					
1997	0.02	0.22	0.27	0.35	0.42	0.55	0.66				
1998	-0.14	0.02	0.10	0.13	0.24	0.39	0.40	0.81			
1999	-0.08	-0.03	-0.03	0.07	0.15	0.19	0.31	0.53	0.65		
2000	-0.11	-0.04	-0.12	-0.07	0.09	0.19	0.26	0.54	0.70	0.75	
2001	-0.12	-0.05	0.00	0.01	0.10	0.25	0.24	0.57	0.71	0.71	0.84

Similarly, W = 17.72 (d.f.=3) for testing the equality of the coefficients of RD rejecting the null hypotheses at the 1 % significance revel, as well. The coefficients of RD are different among the four groups.

Table 5 shows the estimates of autocorrelation matrix for the error terms, which are calculated from the estimates of covariance matrix. There are strong autocorrelations for the error terms in our model applied to the Japanese manufacturing firms. This fact is typically observed as for the accounting data as pointed out in Section 2.

We apply the likelihood ratio test static explained in Appendix for testing the hypothesis of equation (11) in Section2. The result indicates LR=4935.69 (d.f.=77), strongly rejecting the null hypothesis at 1% level. The error terms have significant autocorrelations. We should use the generalized least square (GLS) method of estimation. Application of the conventional OLS estimation to the data with panel structure of this study is not justifiable.[4]

We conduct the same analysis as before by using the TA measured from book value instead of the replacement value in order to examine how sensitive the model is to the choice of measurements of TA. Table 6 shows the estimates of parameters. The results are essentially the same as those in Table 4 except for the estimate of the coefficient for the RD in the group 1, (β_{21}). The estimate is significant in Table 4 while it is not in Table 6. We can say that our model is reasonably robust against the measurements of TA.[5]

Regardless of evaluating TA by either replacement costs or book-values, the values of off-balance-sheet asset and liability can not be taken account for as far as IA is defined in equation (3). Hence, it should be very careful to generalize the results of this paper.

[4] If we assume the first-order autoregressive made in the error terms as explained in footnote 1 even though it is not fully justifiable, we obtain the estimate $\hat{\rho} = 0.666$. This value of estimate clearly rejects the null hypothesis of $\rho = 0$. Again the error terms have positive autocorrelations.

[5] We estimated the coefficients of the equation (6) by using the OLS when the model is applied for each of the groups separately. The estimates are roughly the same as those from the FGLS though we do not report here. But the residuals exhibit strong autocorrelations, and then the OLS is not justifiable even if the estimates happen to be similar to those from the FGLS.

Table 6 - Estimates of Coefficients for Equation (6) with TA measured from the book value

Variables \ Group	(1) Very Low	(2) Low	(3) High	(4) Very High
AD	-0.396	-0.059	-5.129	2.316
$\hat{\beta}_{1j}$	(-0.22)	(-0.04)	(-2.32)	(3.34)
RD	-0.323	-0.810	-0.592	2.572
$\hat{\beta}_{2j}$	(-0.22)	(-0.86)	(-0.91)	(5.54)

Note: The values in parentheses indicate t-values.

4. Conclusions

This paper analyzed the effects of advertising and R&D expenditures on the values of intangible assets for the Japanese manufacturing firms listed on the first- and second sections of the Tokyo Stock Exchange market for 12 years during the periods of 1990 and 2001. The 382 firms were chosen by reasonable criteria stated in section 3. The data set comprises a panel structure with cross-section as well as time series properties.

The empirical results revealed the two findings. (i) For the top 25% of the 382 firms examined in this paper, the advertising and R&D expenditures significantly increase the value of intangible assets, but for the other 75% neither the advertising nor R&D expenditure increases the value of intangible assets. This result suggests that it is not a wise strategy to impose an identical relationship among all firms, and we need to classify the firms into subgroups by some criteria when we analyze the intangible assets of the Japanese firms. (ii) The error terms of the model exhibit strong autocorrelations. The conventional use of the OLS method for estimating the model is not justified for the accounting data we investigated; instead we should use an appropriate method of the feasible generalized leased squares (FGLS).

The idea of classification of the firms into subgroups is found in some literatures for analyzing the American firms. Aboody and Lev (2000) and Chan, Lakonishok and Sougiannis (2001) classified the firms by the amount of R&D expenditures, for example. Our result indicates that the classification of the firms is meaningful for studying the Japanese firms. Fujita (2001) proposed a cost approach for initially measuring the home-grown brands of the firms. The result of this paper provides her claim not only an empirical support but also a caution against the application of a uniform rule over all the firms. The other criteria proposed by this paper for dividing the firms are worth investigation as future research.

We focused our attention only on the current effects of AD and RD on IA in this paper, and will leave the extension of the model to analyze the effects of lagged variables of AD and RD for future research. Since we do not take account for the values of off-balance-sheet asset and liability, it should be careful to generalize the results of this paper.

We proposed a rather sophisticated statistical method to empirically study in the field of accounting. To our knowledge, there has never been previous analysis applying the generalized least squares method to the time series data. We believe that this method is potentially applicable to many problems in the field of accounting discipline.

Appendix

The appendix explains the econometric model, its estimation procedure, and test statistics for the hypotheses of equations (9) and (11) for the readers who are not familiar to econometric literatures. See Greene (2000) for more detailed explanations.

[A] The Econometric Model and Its Estimation Procedure

We consider the regression model

$$y_{ijt} = \alpha_{jt} + \mathbf{x}_{ijt}'\beta_j + \varepsilon_{ijt} \qquad \text{(A.1)}$$

$$i = 1, 2, \ldots, I_j\,;\ j = 1, 2, \ldots, J\,;\ t = 1, 2, \ldots, T;$$

where $\mathbf{x}_{ijt} = (x_{1ijt}, x_{2ijt}, \ldots, x_{kijt})' : k\times 1$; $\beta_j = (\beta_{1j}, \beta_{2j}, \ldots, \beta_{kj})' : k\times 1$; k=number of independent variables; I_j=number of firms within the j-th group; J=number of groups; T=number of years with t=1 indicating the year of 1990.

We formulate the regression equation of (A.1) in a matrix form for simplifying exposition along with three steps. First stacking the variables with time, we have

$$\begin{pmatrix} y_{ij1} \\ \vdots \\ y_{ijT} \end{pmatrix} = \begin{pmatrix} 1 & & \mathbf{0} \\ & \ddots & \\ \mathbf{0} & & 1 \end{pmatrix} \begin{pmatrix} \alpha_{j1} \\ \vdots \\ \alpha_{jT} \end{pmatrix} + \begin{pmatrix} \mathbf{x}_{ij1}' \\ \vdots \\ \mathbf{x}_{ijT}' \end{pmatrix} \beta_j + \begin{pmatrix} \varepsilon_{ij1} \\ \vdots \\ \varepsilon_{ijT} \end{pmatrix},$$

which in turn reduces to the next formulae by using a matrix notation:

$$\begin{aligned} y_{ij.} &= \mathbf{I}_T\,\alpha_{j.} + \mathbf{X}_{ij.}\,\beta_j + \varepsilon_{ij.}, \\ &= \left(\mathbf{I}_T \,\vdots\, \mathbf{X}_{ij.}\right)\begin{pmatrix} \alpha_{j.} \\ \hline \beta_j \end{pmatrix} + \varepsilon_{ij.}, \qquad \text{(A.2)} \\ y_{ij.} &= \mathbf{X}^*_{ij.}\,\beta^*_j + \varepsilon_{ij.}, \end{aligned}$$

$$\varepsilon_{ij.} \sim N(\mathbf{0},\ \Sigma);\quad \Sigma = \begin{pmatrix} \sigma_{11} & \cdots & \sigma_{1T} \\ \vdots & \ddots & \vdots \\ \sigma_{T1} & \cdots & \sigma_{TT} \end{pmatrix},$$

where $\mathbf{I}_T$ denote a unit matrix of size T, Σ is a symmetric positive definite matrix with unknown parameters T(T +1)/2, and $\mathbf{X}_{ij.}$, $\mathbf{X}^*_{ij.}$, $\alpha_{j.}$, β_j, β^*_j are conformably defined though we do not state each explicitly.

Second stacking firms within j-th group into a vector, we have in a similar manner to (A.2);

$$\begin{pmatrix} y_{1j.} \\ \vdots \\ y_{Ij.} \end{pmatrix} = \begin{pmatrix} X^{*}_{1j.} \\ \vdots \\ X^{*}_{Ij.} \end{pmatrix} \beta_j^{*} + \begin{pmatrix} \varepsilon_{1j.} \\ \vdots \\ \varepsilon_{Ij.} \end{pmatrix}$$

$$y_{.j.} = X^{*}_{.j.}\ \beta^{*}_{j} + \varepsilon_{.j.} \tag{A.3}$$

where

$$E[\varepsilon_{.j.}\,\varepsilon'_{.j.}] = \begin{pmatrix} E[\varepsilon_{1j.}\,\varepsilon'_{1j.}] & \cdots & E[\varepsilon_{1j.}\,\varepsilon'_{Ij.}] \\ \vdots & \ddots & \vdots \\ E[\varepsilon_{Ij.}\,\varepsilon'_{1j.}] & \cdots & E[\varepsilon_{Ij.}\,\varepsilon'_{Ij.}] \end{pmatrix} = \begin{pmatrix} \Sigma & \cdots & 0 \\ \vdots & \ddots & \vdots \\ 0 & \cdots & \Sigma \end{pmatrix} \tag{A.4}$$

and $\varepsilon_{.j.} \sim N(0, I_{Ij} \otimes \Sigma)$, $\otimes$ denote the Kronecker product of two matrices.

Third, stacking groups into a vector, we obtain the final form.

$$\begin{pmatrix} y_{.1.} \\ \vdots \\ y_{.J.} \end{pmatrix} = \begin{pmatrix} X^{*}_{.1.} & & 0 \\ & \ddots & \\ 0 & & X^{*}_{.J.} \end{pmatrix} \begin{pmatrix} \beta_1^{*} \\ \vdots \\ \beta_J^{*} \end{pmatrix} + \begin{pmatrix} \varepsilon_{.1.} \\ \vdots \\ \varepsilon_{.J.} \end{pmatrix}$$

$$y_{...} = X^{*}_{...}\beta^{*}_{.} + \varepsilon$$

$$y = X\beta + \varepsilon \quad \text{(A.5)}$$

$$\varepsilon \sim N(0,\ \Omega), \quad \Omega = I_M \otimes \Sigma,$$

where $M = \sum_{j=1}^{J} I_j$ (the total number of firms), and β is a (T+K)J$\times$1 vector.

The equation (A.5) is a canonical form for the general regression model with a covariance structure for error terms. The generalized least square (GLS) method is applied to estimate parameters

$$\hat{\beta} = (X'\Omega^{-1}X)^{-1}X'\Omega^{-1}y \tag{A.6}$$

Unfortunately, this estimator is not applicable in practice because of unknown parameter Ω. However, we can apply an algorithm of feasible generalized least square (FGLS) estimator by estimating the unknown parameters in equation (A.6) as follows:

Step 1: Apply the ordinary least square (OLS) estimator to obtain an initial value of β and $\Sigma=(\sigma_{st})$;

$$\hat{\beta}^{(0)}=(\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}'\mathbf{y},\ \hat{\varepsilon}^{(0)}=\mathbf{y}-\mathbf{X}\hat{\beta}^{(0)},\text{ and }\hat{\sigma}_{st}^{(0)}=\frac{1}{M}\sum_{j=1}^{J}\sum_{i=1}^{Ij}\hat{\varepsilon}_{ijs}^{(0)}\hat{\varepsilon}_{ijt}^{(0)} \tag{A.7}$$

Step 2: Use the GLS with replacing Ω in (A.6) by $\hat{\Omega}$(k-1) obtained by step 1.

$$\begin{aligned}&\hat{\beta}^{(k)}=(\mathbf{X}'\hat{\Omega}^{(k-1)^{-1}}\mathbf{X})^{-1}\mathbf{X}'\hat{\Omega}^{(k-1)^{-1}}\mathbf{y},\ \hat{\varepsilon}^{(k)}=\mathbf{y}-\mathbf{X}\hat{\beta}^{(k)},\\ &\hat{\sigma}_{st}^{(k)}=\frac{1}{M}\sum_{j=1}^{J}\sum_{i=1}^{Ij}\hat{\varepsilon}_{ijs}^{(k)}\hat{\varepsilon}_{ijt}^{(k)},\text{ and}\\ &\hat{\Sigma}^{(k)}=(\hat{\sigma}_{st}^{(k)}),\ \hat{\Omega}^{(k)}=\mathbf{I}_{\mathbf{M}}\otimes\hat{\Sigma}^{(k)}.\end{aligned} \tag{A.8}$$

Step 3: Go to Step 2 until both $\hat{\beta}^{(k)}$ and $\hat{\Sigma}^{(k)}$ converge.
Denoting thus obtained estimates as $\hat{\beta}$, $\hat{\Sigma}$, we have $\hat{\beta}\sim N(\beta,\hat{\mathbf{V}})$, $\hat{\mathbf{V}}=(\mathbf{X}'\hat{\Omega}^{-1}\mathbf{X})^{-1}$.

[B] Test statistics for testing the hypotheses in (9) and (11)

We construct the Wald test statistic for testing the hypotheses of a linear restriction on the parameters $\mathbf{R}\beta=\mathbf{r}$, where $\mathbf{R}$: $p\times(T+K)J$, and $\mathbf{r}$: $p\times 1$, are known matrices. Under the assumption that the null hypotheses is correct,

$$W=(\mathbf{R}\hat{\beta}-\mathbf{r})'(\mathbf{R}\mathbf{V}\mathbf{R}')^{-1}(\mathbf{R}\hat{\beta}-\mathbf{r})\ \sim\ \chi_{(p)}^{2} \tag{A.9}$$

is distributed as χ^2 – distribution with degrees of freedom p. The Wald statistic in (A.9) is used for testing (9). The likelihood statistics for testing equation (11) in formulated as follows: Let the joint density of y be

$$\begin{aligned}&f(y;\beta,\Sigma)=\frac{1}{(\sqrt{2\pi})^{N}|I_M\otimes\Sigma|^{1/2}}\exp\left\{-\frac{1}{2}(y-X\beta)'(I_M\otimes\Sigma)^{-1}(y-X\beta)\right\}\\ &LR=-2\log\left(\frac{\max_{\beta,\Sigma}f(y;\beta,\Sigma)}{\max_{\beta,\Sigma=\sigma^2 I_T}f(y;\beta,\Sigma)}\right)\end{aligned} \tag{A.10}$$

After some calculations, we have

$$LR=M(T\log(\hat{\sigma}^2)-\log|\hat{\Sigma}|)\sim\chi^2_{\left(\frac{T(T+1)}{2}-1\right)}, \tag{A.11}$$

where $\hat{\sigma}^2=\frac{1}{N}\mathbf{y}'(\mathbf{I}-\mathbf{X}(\mathbf{X}'\mathbf{X})^{-1}\mathbf{X}')\mathbf{y}$ is the OLS function of $\hat{\sigma}^2$. Under the null hypotheses, LR is distributed on χ^2-distribution with degrees of freedom $(\frac{T(T+1)}{2}-1)$.

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Shareholder Activism with Weak Corporate Governance: Social Pressure, Private Cost and Organized Crime

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ABSTRACT

Prior research provides mixed results on the ability of American shareholder activists to improve managerial behavior. In Japan, the means of external control (e.g., takeover, litigation) are not as effective as they are in the U.S. Challenging management during annual meetings may be the only option left for disgruntled shareholders. Yet, the situation is complicated by the existence of corporate racketeers who disrupt meetings to blackmail managers. In response, authorities have encouraged companies to hold their annual meetings on the same day to spread the racketeers' thin over simultaneous events. However, this policy has a similar effect on legitimate activists. Our empirical results indicate that, contrary to governmental expectations, shareholder activism leads to improvement in a company's corporate governance, informational environment and profitability. It also enables firms to attract foreign shareholders. In addition, firms that collude to have their meetings on the same day have lower profitability and worse governance. This provides evidence of the positive role activists may play and suggests the authorities should reverse their policy of discouraging shareholder activism.

Keywords: shareholder activism, annual meeting, organized crime

1. Introduction

Without external pressure, managers may behave in ways that are sub-optimal for the shareholders. Legal recourse and corporate governance are often seen as ways to mitigate this behavior (e.g., Gompers et al. [2003]). But what can shareholders do when the means of creating external pressure to control such behavior are not widely available? One possibility is shareholder activism but this has had mixed success in the U.S. (e.g., Wahal [1996], Karpoff et al. [1996]). One hypothesis is activism is not effective when there are other means of disciplining managers. In Japan, these other means are generally not available. For example, shareholder litigation is rare (West [1999]), the market for takeovers is not active (Shleifer and Vishny [1997]), and managers' compensation is typically not based on the stock price (Kaplan [1994]). In this context, challenging the management during annual meetings may be one of the few choices left to disenfranchised investors, apart from selling their stocks.

Prior anecdotal evidence suggests maintaining control during an annual meeting is important for managers. For example, the length of large firms' meetings is usually the top story on the Japanese evening news and banks have to report promptly the length of their meetings to the Ministry of Finance (West [1999]). In addition, the length of the meeting is systematically reported in trade journals. More than 40% of the meetings in our sample lasted between 25 and 35 minutes. This suggests departure from the target of

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a 30-minute meeting is costly for managers and, thus, any deviation in the meeting length should only occur under outside pressure. The effect of social embarrassment appears to be particularly strong in Japan but is not unique to this country. For instance, the American shareholder activist Robert Monks successfully resorted to public shaming of the directors of Sears after his proxy fight failed.[1]

We explore empirically several consequences of activism. Our results indicate profitability, measured by returns on assets (ROA) and stock price performance, improves after sudden long meetings ("spikes"), partly because of the disposal of non-performing assets. This result stands in contrast to the results found in the U.S. For example, Karpoff et al. (1996) find no improvement in operating returns for American firms while Song and Szewczyk (2003) find no improvement in expected future earnings. Transparency also improves for targeted firms. Subsequent meetings become more active, with more shareholders attending and more questions being asked. The amount of firm specific information available to investors (measured by the synchronicity of the firm with the rest of the stock market) increases. Finally, the percentage of shares held by foreign investors increases, while the percentage held by financial institutions decreases. These results hold after endogenizing the occurrence of a long meeting with a two-step estimation process (Maddala [1983]) and controlling for numerous factors such as change in growth opportunities. In other words, these results are not the simple turnaround of distressed companies. Overall, they suggest activists are able to use the embarrassment caused by long meetings to improve governance.

Confronted with the threat of activism, managers have resorted to several techniques to control the length of their meetings and avoid embarrassment.[2] This gave organized crime a unique opportunity to prosper. *Sôkaiya* are corporate extortionists who operate during shareholders' meetings. For a fee, they guarantee management the annual meeting will proceed smoothly by intimidating "legitimate" shareholders.[3] At the same time, they threaten to disrupt the meeting if their offer is declined. In 1997, a survey of 1,200 Japanese firms revealed that 67% admitted to having paid *sôkaiya*, even though such payments became a criminal offense in 1982.[4] Although there is much written about the *sôkaiya* in the popular press, little systematic work beyond the reporting of anecdotal evidence has been done.

In response to the perceived threat of organized crime, authorities have encouraged, companies to hold their annual meetings on the same day of the year to spread the *sôkaiya* manpower thin over numerous simultaneous events. Yet, this policy has a similar effect on legitimate activists. Thus, management may be able to implement practices that limit outside pressure and use the *sôkaiya* to justify them, even if the firm is not under their immediate threat. We find firms that choose meetings on the national meeting day are less likely to be targeted by activists. They also under-perform in terms of profitability or governance. They have fewer foreign investors. However, after being successfully pressured by activists, they tend to choose another date for subsequent meetings. In conjunction with our results on the positive consequences of activism, this

[1] Skeel (2001), Dyck and Zingales (2003) or Wu (2003) provide some systematic analysis on this issue.
[2] One example of such techniques is to stack the front row seats with employees.
[3] We define "legitimate" shareholder activism as the activity of shareholders who are not associated with organized crime, who ask questions pertaining to the firm (as opposed, for example, to questions related to the private life of the executives) and who do so with the intent of improving the operations of the firm.
[4] "Fushoji de Nigeru na," 894 Nikkei Business, pp. 38-45 (1997).

suggests *sôkaiya* are generally not a problem for the governance of Japanese firms but managers strategically use the perception of this threat to justify poor governance practices.

In addition, these findings enable us to reject an alternative explanation for our first set of results. Under this alternative scenario, meeting length would not be driven by shareholder activism but rather by the meeting agenda set up by managers. For example, managers, confronted with an adverse economic situation, would voluntarily decide to restructure the firm and announce their plans at the meeting, which would lead to longer gatherings. However, if this was true, the meeting date should not prevent managers from spending the necessary time to present their plan. More generally, if managers could easily control the meeting length or were indifferent to it, they should not try to strategically time it. For example, they should not try to take advantage of the national clustering when firm's performance is bad. Second, there should be no relation between the date of the meeting and subsequent firm's performance, even *after controlling* for the fact that performance and transparency may affect the choice of the date. Similarly, we should not find a negative relation between being subjected to a long meeting in one year and choosing not to have the subsequent ones on the national day, even *after controlling for the improvement* in the firm's economic situation or transparency. In other words, the date of the meeting should not have any economic effect. This is not consistent with our empirical findings. On the other hand, if our first results are driven by shareholder activism, techniques designed to prevent it (such as clustering meetings on a national day) should have an impact. This is what we find. Third, we directly investigate the meeting agenda for a sub-sample of firms that experienced a long meeting. We do not find management put more items on the agenda than in the year prior to the long meeting. In addition, the management put fewer items than in a control group of firms of comparable size and profitability that did not experience a long meeting in the same year. These three points and the use of two-step techniques to estimate the effect of long meetings lead us to conclude our results are not primarily driven by endogeneity.

We believe this study makes several contributions. First, it contributes to our understanding of shareholder activism. We find strong evidence of the positive effects of activism, not only on governance and shareholder clientele but also on operations and accounting performance. This is in contrast to the results in the U.S. where the evidence is mixed at best. For example, Song and Szewczyck (2003) note American "shareholder activism has little effect on the target firm's share values, earnings and operations." Our result may be explained by the fact Japan offers a more powerful setting to study the effect of shareholder activism because other mechanisms available are much weaker. We also use a unique dataset that contains information about the length and the activity of annual meetings for a very large cross-section of the economy over ten years. This helps us to draw more general conclusions. It also sheds light on the role of annual meetings, a topic that has received little attention in the literature. Second, we further the understanding of the role of organized crime in the legitimate economy. Although the issue of corporate racketeering is particularly salient in Japan, it exists in other countries. Italian *sôkaiya* are referred to as *disturbatori* while their South Korean counterparts are called *chongheoggun* (West [1999]). Finally, we believe that our empirical results are directly relevant to policy makers. As previously mentioned, Japanese authorities have supported policies restricting activism on the grounds that this

would otherwise hurt the economy. Our analysis suggests the policy is detrimental to market efficiency and corporate governance. Although the specifics may be unique to Japan, comparable claims have been made elsewhere by managers trying to obtain legal protection from the authorities against external shareholders. For example, American managers have claimed that direct election of directors during annual meeting may cause harm to the firms.[5] Japanese managers were perhaps uniquely successful in obtaining this political protection by using the threat of organized crime as a justification. We believe that our results speak to this general issue.

The remainder of this paper is organized as follows. In Section I, we provide background information on shareholder activism. In Section II, we develop our hypotheses. Section III describe the sample and presents descriptive statistics. Section IV reports the empirical tests and results. We conclude in Section V.

2. Background of Shareholder Activism

2.1 "Legitimate" Activism

Whether outside shareholders can influence corporate governance or profitability through public activism has been mainly studied with U.S. data. Evidence of positive influence is mixed at best. Wahal (1996) considers the effect of public shareholder activism by pension funds on American companies. He reports that there are no significant abnormal returns at the time of the targeting for the vast majority of firms. Prior results also suggest that there is no evidence of significant long-term improvement in either stock price or accounting performance. Karpoff et al. (1996) find comparable results for shareholder-initiated proxy proposals. Smith (1996) also finds no improvement in operating performance of firms targeted by CalPERS although there is an increase in stock prices of firms that agreed to cooperate with the fund. Strickland et al. (1996) analyze the effect of the United Shareholder Association, an association of largely small shareholders, which negotiated 53 agreements with mainly large and poor performing American firms to improve their corporate governance. The announcement of the agreement led to an average abnormal return of 0.9%.[6] Prevost and Rao (2000) report that firms targeted once by pension funds experience no long-term abnormal returns but firms subjected to repeated attacks experience negative returns.

In contrast to the number of studies on shareholder activism in U.S. firms, the amount of research on shareholder activism in Japanese firms is limited. An example of activism is provided by Yoshiaki Murakami, a leading shareholder activist, who mounted an attack on the *Tokyo Style* management in 2002, asking the company to increase dividends, to buy back stocks and to appoint outside directors. Although all his resolutions were rejected by a large margin during a marathon eight- hour shareholders'

[5] For example, the Business Round Table states on its web sit: "The proposed [Election Contest] rules would have widespread and harmful unintended consequences, enabling a small number of shareholders and advisory services to impose significant costs on all shareholders, often for reasons wholly unrelated to sound corporate governance or the welfare of the corporation. Indeed, the diversion of corporate attention and resources away from the day-to -day business of the corporation that would result from the proposed rules could have adverse implications for the economy as a whole."

[6] Interestingly, T. Boone Picken, the founder of the *United Shareholder Association*, tried to bring the same methods to Japan but was shouted down by *sôkaiya* on his first (and only) attempt.

annual meeting, the company subsequently decided to comply voluntarily with his demands.[7]

2.2 Sôkaiya

Sôkaiya are corporate extortionists who are typically connected to local organized crime groups (*yakuza*). They guarantee management the company's annual meeting will proceed smoothly and undesirable questions will be controlled. At the same time, they threaten to disrupt the meeting if their offer is declined.[8]

Anecdotal evidence suggests *sôkaiya* may play an important role in the economy. For example, in 1997, *Dai-Ichi Kangyo Bank*, the fifth largest corporation in the world at the time, allegedly offered one *sôkaiya* a bribe of $96 million in the form of a "loan". The proceeds were used to blackmail the biggest Japanese brokerage houses. Other world-famous corporations such as *Hitachi, Toshiba, Mitsubishi, Toyota, Nissan* and many others have either admitted to or have been rumored to paying- off the extortionists. An executive at *Ajinomoto*, a processed food company, is said to have had a budget of as much as Y100 million a year to negotiate with the *sôkaiya* (Ogino [1997]). The meetings at *Matsuzakaya*, a large Japanese retailer, lasted four hours in 1994 and three in 1995, extraordinary lengths by Japanese standards. The management started paying the *sôkaiya* in 1996. The meeting then lasted nineteen minutes in 1996 and thirty-eight in 1997.[9] Despite of this seemingly strong influence of the *sôkaiya*, this phenomenon has lacked systematic investigation. For example, Maruko (2002) notes that "it is somewhat surprising that more has not been written about this form of organized crime."

The perceived threat from the *sôkaiya* is sufficiently credible that Japanese authorities encourage firms to hold their meetings on the same date. They even help firms to coordinate and choose a common date. The clear drawback of this strategy, however, is that it has a similar chilling effect on legitimate activists who cannot effectively participate in meetings that are held simultaneously. In this context, the fact that 67% of the firms admit paying *sôkaiya* might be explained by a managerial interest in keeping the threat credible.

3. Hypotheses Development

We use the existence of an abnormally long meeting (a "spike") as a sign of activism, whether it is caused by *sôkaiya* or by legitimate activists. It is likely that in certain instances *sôkaiya* or legitimate activists approach management prior to the meeting and obtain what they want just by threatening to disrupt the meeting. Our tests therefore are likely to understate the real magnitude of the effect of contentious meetings. However,

[7] "Murakami questions Tokyo Style voting," *Financial Times*, 24 May 2002; "Murakami Questions Tokyo Style Over UFJ Group Investment," *Nikkei Report*, 3 December 2002; "Tokyo Style Buys Back 4mn of Own Shares," *Nikkei Report*, 17 October 2002.

[8] Their actions typically involve non-violent methods. Ryall (2003) describes their approach in the following way: "If a company's management refuses their demands for a payoff, they disrupt the meeting, shouting abuse at board members and accusing them - with or without grounds - of sexual misconduct or gross mismanagement. In a nation famed for its love of harmony, their tactics proved remarkably successful for half a century."

[9] Matsuzakaya Torishimariyaku to Sokaiya wo Taiho," *Mainichi Shinbun*, October 20, 1997.

we have no reason to believe either group is better than the other at extracting concessions based on the threat of disruption. Therefore, we do not expect the direction of the effect to be systematically biased in favor of either group.

We empirically investigate several possible consequences of "spikes". First, we consider the effect on subsequent meetings. If "spikes" are the precursor of an improvement in corporate governance, subsequent meetings should be less perfunctory. Attendance should be higher and more questions should be asked. On the other hand, if lengthy meetings signal the arrival of organized crime, the opposite should be expected. Second, we consider the effect on the informational environment by studying synchronicity of the firm's stock with the rest of the exchange. Durnev et al. (2001) report firm-specific stock price variability is positively correlated with measures of stock price informativeness. The more firm-specific information is incorporated into the price, the less the stock covaries with the rest of the exchange.[10] If lengthy meetings announce an increase in disclosure, the firm's synchronicity (i.e., the R^2 of a regression explaining the firm's returns by the variation in the overall market and the industry index) should subsequently decrease. Opposite results would be expected in cases of *sôkaiya* activism. Third, we consider the effect on profitability. If long meetings are due to disgruntled shareholders, management may initiate restructuring to improve the firm's operations, in which case the ROA and the likelihood of making a profit should improve. Finally, we consider the impact of "spikes" on shareholder composition. If firms become more transparent and shareholder- friendly, they should attract a larger proportion of foreign shareholders who could not initially access information on the firm in a timely manner and may feel at a disadvantage competing with large Japanese shareholders such as financial institutions. Conversely, if organized crime's influence increases, there should be a reduction in the number of foreign shareholders.

4. Sample and Descriptive Statistics

4.1 Sample

We hand-collected all information about the annual meetings (length, date, number of shareholders present, number of questions asked) from the *Shiryoban Shoji Homu*. This publication reports information on virtually every large and mid-size Japanese firm. We obtained data on price, earnings and other accounting information from the PACAP database. We followed the convention of eliminating firms from the financial, insurance and real estate sectors (PACAP item INDID equal to 501, 511, 512, 513 or 601) since these firms face a different corporate governance environment.[11] The sample period covers 10 years from 1991 to 2000.

[10] To validate this result with Japanese data, we compute measures of price informativeness for Japanese securities similar to the ones described by Durnev et al. (2001) or Lundholm and Myers (2002). When we regress synchronicity on these measures (and several control variables), the coefficients are negative, consistent with synchronicity being a measure of the amount of firm-specific information available to the Japanese market participants.

[11] When relevant, securities other than common stocks are deleted (PACAP item STKTYP not equal to 1).

Table 1 - Summary Statistics.

Variable	Length	Meeting Questions	Attendance	PERC
Mean	28.37	0.37	84.71	1.09
Standard Deviation	16.79	1.40	129.00	1.03
Median	25	0	58	0.80
Minimum	2	0	2	0.01
Maximum	321	25	2,508	20.97
N	12,708	12,708	12,708	12,708

Length is expressed in minutes. Meeting questions are expressed in number of questions. Attendance is the number of shareholders present at the annual meeting. PERC is the percentage of shareholders attending the meeting (multiplied by 100 to be expressed in %).

4.2 Descriptive Statistics

Descriptive statistics are reported in Table 1. Annual meetings in Japan are not typically lengthy. They last less than thirty minutes on average and no question is asked in the wide majority of the cases. It is even a bit surprising that an average of 85 shareholders (or slightly more than 1% of the shareholders) bother attending. By comparison, *General Motors* received a lot of negative press coverage in 1995 for having its shortest and smallest meeting in decades. It lasted two and a half hours, was attended by 137 shareholders (versus more than 1,600 people in 1992, a more typical year) and cost $150,000 (versus $1.2 million in 1994).[12]

4.3 Three Day Return

We define a "spike" as an annual meeting that lasts 50% more than the average time for a given firm. Given the institutional and cultural background described in the introduction, we use "spikes" as a measure of the private costs imposed on the manager by an unruly meeting. To avoid cases where there is a large proportional but small absolute increase (e.g., a meeting lasting 16 minutes for a firm with an average of 10 minutes), we also require that the gathering lasts more than thirty minutes (the average meeting length in Japan reported in Table 1).

We first consider the three-day (the day of the meeting, the previous trading day and the subsequent one) cumulative market-adjusted return after a lengthy meeting but we do not find any significant abnormal market reactions. This suggests management does not choose to have a long meeting to announce important news such as plans to restructure the company or changes in the investment opportunity set. On the other hand, the absence of price reaction should be expected if the "spike" is due to shareholder activists who have already anticipated the benefit of their action before a long meeting and do not want to "leave any money on the table".[13]

[12] "New GM Annual Meeting: Smallest, Shortest and Cheapest, But Circus-Like," *The Associated Press*, 26 May 1995.

[13] This argument does not imply that the shareholders will correctly anticipate every outcome of the meetings but rather that they have rational expectations about the likelihood of success.

Table 2 - Description of the Items on the Agenda.

	"Pre-Spike" Year	"Spike" Year	Control Sample
Director Election	65%	85%	95%
Auditor Nomination	95%***	55%	35%
Retirement Allowance	100%**	80%	90%
Amendment of the by-laws	40%	20%	45%**
Treasury Stocks	15%	10%	20%
Other Items	5%	10%	10%
Total	3.2***	2.4	2.95**

We investigate a random sample of firms experiencing a "spike." For these firms, we report the number of items put on the agenda by the management. We report this total number in Row VII, Column II. We compare it to the number put on the agenda the year prior to the "spike" (Column I) and to a sample of 20 firms randomly matched on year, size and profitability that did not experience a "spike" (Column III). We also report the percentage of firms that put various items (director election, auditor nomination, retirement allowance, amendment of the by-laws, stock buy-back) on their agenda. Significant differences between the control groups and the firms experiencing a "spike" at the 10%, 5% and 1% level are noted with *, ** and ***, respectively.

4.4 Items on the Agenda

To further study whether the long meeting is voluntarily caused by management, we examine a random sample of 20 firms experiencing a "spike". We investigate the items put on the agenda by management. We then compare these items to the ones put the year prior to "spike" and to a sample of twenty firms matched on size, year and profitability. Results in Table 2 indicate the number of items during the spike is not greater than the year before and is significantly lower than the number put forward in control firms that did not experience a "spike". Results are similar when we disaggregate the number by type of items.

4.5 Long Term Return

We then examine the long-term returns one year prior to the "spike" and one year after. To do so, we form an equally weighted portfolio of firms that had a long meeting and we calculate the difference between their returns and the market return in each month. In the 12 months prior to the "spike", the portfolio had significant average negative returns of -7.18% compared with the market (t-statistic = -5.64).[14] However, in the following year, average monthly returns become indistinguishable from the market, except among firms subjected to multiple long meetings. In this case, the return is marginally negative (p-value=0.08). This result is consistent with U.S. findings (e.g., Song and Szewczyk, [2003]).[15]

5.6 Occurrence of a Long Meeting.

Table 3 reports the likelihood of a long meeting occurring. We find approximately 3% of all meetings in the sample were long. From a theoretical point of view, it is unclear whether "spikes" should be anything but random. If long meetings impose costs on

[14] Excluding the month prior to the meeting (during which annual results are typically announced) gives comparable results.

[15] Song and Szewczyck (2003) report that firms labeled as underperforming by the Council of Institutional Investors have returns indistinguishable from the benchmark after being targeted by the Council.

Table 3 - Likelihood of Having a "Spike."

	$SPIKE_{i,t}$	$SPIKE_{i,t}$
INTERCEPT	-3.14	-3.15
	(-5.47)	(-9.12)
$LOGASSET_{i,t}$	0.09	0.09
	(2.39)	(3.44)
$ROA_{i,t}$	-1.59	-1.58
	(-5.17)	(-3.81)
$LOSS_{i,t}$	0.08	0.18
	(1.27)	(3.15)
$FIRMRET_{i,t-1}$	-0.29	
	(-1.46)	
$FOREIGN_{i,t}$	0.39	
	(1.30)	
$FIN_{i,t}$	-0.09	
	(-0.23)	
$DAY_{i,t}$	-0.38	
	(-1.89)	
$SECTION_{i,t}$	-0.06	
	(-0.79)	
Pseudo-R^2	6.37	1.68
N	9,420	9,420

Table 2 provides the results from Probit regressions with robust standard errors allowing for clustering of observations by year. Z-statistics are reported in brackets. $SPIKE_{i,t}$ is a dummy variable that takes the value of one if there is a "spike" for firm i at year t, zero otherwise). $LOGASSETS_{i,t}$ is the log of assets (PACAP item BAL9). $ROA_{i,t}$ is the ratio of PACAP item INC9 over PACAP item BAL9. $LOSS_{i,t}$ is a dummy variable that takes the value 1 if the net income (PACAP item INC9) is negative, 0 otherwise. $FIRMRET_{i,t-1}$ is the firm yearly return (PACAP item DRETWD) including the month when the annual meeting occurs and the 11 preceding months. $FOREIGN_{i,t}$ is the number of shares owned by foreigners (item JAF79) scaled by the total number of shares (JAF81). $DAY_{i,t}$ is a dummy variable that takes the value of one if the annual meeting is held on the mode date for the date, 0 otherwise. $SECTION_{i,t}$ is dummy variable that takes the value of one if the firm is traded on the first section of the Tokyo Stock Exchange, zero otherwise. Year dummies are not tabulated in column 1.

both the management and the activists (legitimate or otherwise), "spikes" should not happen if the only purpose is to extract concessions from the management and if all parties are fully informed. In this case, the management should optimize the pay-off so that it is not profitable for the activists to incur the cost of an attack. The situation would be similar to the one described by Hicks (1963) in the case of strikes. They happen only in cases of miscalculation by either party and hence they occur randomly. However, we further investigate this question by using two Probit regressions. The dependent variable is *SPIKEi,t* (a dummy variable that takes the value of one if there is a "spike" for firm i in year t; otherwise, the value is zero). The independent variables are *LOGASSETSi,t* (the log of assets, PACAP item BAL9), *SECTIONi,t* (a dummy variable that takes the value of one if the firm is traded on the first section of the Tokyo Stock Exchange; otherwise, the value is zero), *ROAi,t* (the return on assets calculated as the ratio of PACAP item INC9 over PACAP item BAL9), *LOSSi,t* (a dummy variable that takes the value 1 if the net income [PACAP item INC9] is negative; otherwise, the value is zero) and *FIRMRETi,t-1* (the firm's yearly return [PACAP item DRETWD] including the month when the annual meeting occurs and the 11 months preceding).[16] We also

[16] Note that the accounting variables are based on the fiscal year preceding the annual meeting.

include *DAY*i,t (a variable that takes the value of one if the annual meeting is held the national meeting day,[17] otherwise, the value is zero), year dummies, *FOREIGNi,t* (item JAF79, shares owned by foreigners scaled by the total number of shares, JAF81), *FINi,t* (item JAF76-77, shares owned by banks and financial institutions scaled by the total shares).[18] In a second specification, we control only for *LOGASSETSi,t*, *ROAi,t* and *LOSSi,t*.

Results are reported in Table 3, column 1 for the full model and in column 2 for the second specification. They indicate that the likelihood of long meetings is greater in larger firms that are suffering from a loss or a low ROA.[19] This is broadly consistent with the results on firms targeted by American shareholder activists (e.g., Karpoff et al. [1996], Wahal [1996]). The policy of clustering meetings on one day also appears to achieve the goal of reducing the likelihood of a "spike" (z-statistic = -1.89). This result is consistent with "spikes" happening under shareholder pressure. If the long meetings were initiated by management or were simply a by-product of changes in the firm, we would not expect the clustering of the meetings by date to reduce the likelihood of their occurrence.

5. Empirical Tests and Results

In this section, we first report the effects of long meetings and then the effects of meeting clustering.

5.1 The Effect of Long Meetings.

5.1.1 The Effect on Subsequent Meeting Characteristics.

We consider the effect of a "spike" on subsequent meetings. To do so, we use three main specifications. The first one is an ordinary least squares regression with a firm fixed effect (subsequently referred to as OLS FE) using firms that had long meetings.[20] This specification assumes that the occurrence of a "spike" is random and that the effects are permanent. We use the meeting characteristics (collectively referred to as *CHARi,t* in equation (1) below) as the dependent variable. Specifically, we use: (1) *ATTENDi,t*, the number of shareholders attending the annual meeting, (2) *PERCi,t*, the percentage of shareholders attending the annual meeting; (3) *SENTQi,t*, the number of questions sent by mail to the firm before the annual meeting; (4) *MEETQi,t*, the number of questions asked at the meeting; (5) *LENGTHi,t*, the length of the annual meeting in minutes; and finally (6) *DAYi,t*, a dummy that takes the value of one if the meeting is held on the mode date. For the firms with a "spike", we then regress the characteristics on *SPIKEi,t* and *AFTERi,t* (a dummy variable that takes the value of one in the years subsequent to a "spike"; otherwise, the value is zero). *AFTERi,t* is the main variable of interest in this first specification. We control for the size of the firm by including

[17] We define the national meeting day as the mode date for meetings.

[18] We also consider all the change variables subsequently used in the paper. These variables (not tabulated) are not significant, with the exception is the absolute value of the change in assets. Our results are not affected when we include this variable in our analysis.

[19] Results are comparable, but less significant, when we lag the control variables by one year.

[20] Results (untabulated) are more significant when a Seemingly Unrelated Related (SUR) procedure is used instead of OLS.

LOGCAPi,t (the log of the market capitalization, PACAP item MKTVAL, at the end of the month when the annual meeting occurs). To control for the performance of the firm, we include three previously defined variables: *ROAi,t, LOSSi,t* and *FIRMRETi,t-1*. All variables are demeaned to provide a firm fixed effect. To avoid the overlapping and confounding effects of repeated long meetings, firms with multiple "spikes" are deleted when the OLS FE is run.

$$CHAR_{i,t} = \gamma_1 SPIKE_{i,t} + \gamma_2 AFTER_{i,t} + \gamma_3 LOGCAP_{i,t} + \gamma_4 ROA_{i,t} + \gamma_5 LOSS_{i,t} + \gamma_6 FIRMRET_{i,t-1} + e_{i,t}. \quad (1)$$

We use a second specification that controls for the possible endogeneity of the occurrence of long meetings. Following Maddala (1983), we estimate the effect of "spikes" with a two-step process. First, we estimate the likelihood of a "spike" through a Probit regression using *LOGASSETSi,t*, *ROAi,t*, and *LOSSi,t* as exogenous variables (this is similar to the parsimonious model described in III.2).[21] In a second step, we use an OLS regression including *SPIKEi,t* (the main variable of interest in the second and third specifications), *TIMEt* (a time trend), *Iji,t* (industry dummies, not tabulated) and *LAMBDAi,t* (the inverse of the Mills ratio obtained from the first step). The dependent variable in the second step is the change in a meetings' characteristic from the year preceding the meeting (t-1) to the year following the meeting (t+1). We also consider the change from t+1 to t+2 and from t+2 to t+3 but the results are not tabulated. To be consistent with the OLS FE specification, firms with multiple long meetings are deleted in the tabulated results but we perform a sensitivity test on this truncation and discuss the qualitatively similar results obtained from the full sample.

$$\Delta CHAR_{i,t+1} = \beta_0 + \beta_1 SPIKE_{i,t} + \beta_2 TIME_t + \beta^j_3 I_{j,i,t} + \beta_4 LAMBDA_{i,t} + e_{i,t}. \quad (2)$$

As an alternative third specification, we use variables in the second step that are identical to the ones in the OLS FE but, instead of demeaning them, we take the difference between t-1 and t+1.[22] To ensure that the results are not driven by corporate events simply correlated with long meetings but not related to shareholder activism, we also include *ΔSHRi,t+1* (the absolute value of change in the total number of shares divided by the number of shares at t-1) and *ΔASSETi,t+1* (the absolute value of the change in total assets divided by total assets at t-1). [23] *ΔSHRi,t+1* proxies for the changes in equity due to events that may trigger a longer meeting such as share issuances or buy-backs. *ΔASSETi,t+1* proxies for a change in investment due to similar events such as major acquisitions or significant divestures.[24]

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[21] Results are qualitatively similar when *DAY* is included in the first stage.

[22] Note that this last specification is for descriptive purposes since we subsequently treat *ΔROAi,t+1* and *ΔLOSSi,t+1* as endogenous variables with respect to the "spike."

[23] Taking the signed value does not affect our results.

[24] In addition, we hand-collected the date of the last change of CEO from *Yakuin Shikihou* (*Management Quarterly Journal*) for firms experiencing a "spike." We include a dummy variable that takes the value of one if the firm experienced a "spike" and a CEO change in the same year, zero otherwise. Results (not tabulated) are qualitatively similar to the ones reported and the significance of $SPIKE_{i,t}$ is generally not affected. This suggests that managerial turnover is not driving our results.

Table 4 - Effect of a "Spike" on Future Annual Meetings.
Panel A: Differences with Industry Fixed Effects and Time Trend.

	$\Delta ATTEND_{i,t+1}$	$\Delta PERC_{i,t+1}$	$\Delta MEETQ_{i,t+1}$	$\Delta LENGTH_{i,t+1}$	$\Delta DAY_{i,t+1}$
INTER.	-4.04	-0.31	0.53	2.94	0.05
	(-0.33)	(-1.75)	(1.53)	(0.66)	(0.86)
$SPIKE_{i,t}$	113.28	1.00	2.26	7.80	-0.26
	(4.09)	(2.40)	(2.94)	(0.69)	(-1.88)
$TIME_t$	-0.10	-0.01	0.03	0.60	-0.01
	(-0.64)	(-2.63)	(7.85)	(10.43)	(-11.35)
$LAMBDA_{i,t}$	-40.76	-0.37	-0.92	-3.67	0.10
	(-3.67)	(-2.18)	(-2.98)	(-0.80)	(1.83)
N	9,416	9,415	9,420	9,420	9,420

Panel B: Differences with Firm Level Controls.

	$\Delta ATTEND_{i,t+1}$	$\Delta PERC_{i,t+1}$	$\Delta MEETQ_{i,t+1}$	$\Delta LENGTH_{i,t+1}$	$\Delta DAY_{i,t+1}$
INTER.	-0.53	-0.04	0.05	1.31	0.00
	(-0.78)	(-3.83)	(2.76)	(5.16)	(0.10)
$SPIKE_{i,t}$	115.79	1.14	2.63	25.64	-0.32
	(4.32)	(2.81)	(3.45)	(2.40)	(-2.30)
$\Delta LOGCAP_{i,t+1}$	3.18	0.12	-0.01	1.09	0.01
	(3.37)	(8.94)	(-0.45)	(3.10)	(1.37)
$\Delta ROA_{i,t+1}$	-13.51	-0.13	-0.04	2.32	-0.11
	(-1.95)	(-1.30)	(-0.20)	(0.89)	(-3.22)
$\Delta LOSS_{i,t+1}$	1.28	0.01	0.05	1.81	-0.01
	(1.41)	(1.02)	(1.83)	(5.36)	(-2.54)
$\Delta FIMRET_{i,t}$	-2.11	-0.06	-0.02	-1.81	-0.01
	(-3.09)	(-6.60)	(-1.04)	(-7.12)	(-3.13)
$\Delta SHR_{i,t+1}$	0.64	-0.09	0.01	-0.02	-0.00
	(2.01)	(-19.50)	(0.60)	(-0.17)	(-2.80)
$\Delta ASSET_{i,t+1}$	3.08	-0.10	0.06	-2.55	0.01
	(0.88)	(-2.10)	(0.58)	(-1.99)	(0.44)
$LAMBDA_{i,t}$	-41.62	-0.41	-1.06	-10.58	0.12
	(-3.86)	(-2.58)	(-3.45)	(-2.46)	(2.19)
N	9,416	9,415	9,420	9,420	9,420

Z-statistics (panels A and B) are reported in brackets. Standard errors are corrected according to Maddala (1983). Results for the industry dummies are omitted from panel A. Coefficients for $\Delta PERC$ are multiplied by 100 for expositional clarity. $ATTEND_{i,t}$ is the number of shareholders attending the annual meeting of firm i at time t. $PERC_{i,t}$ is the percentage of shareholders attending the annual meeting. $SENTQ_{i,t}$ is the number of questions sent by mail to the firm before the annual meeting. $MEETQ_{i,t}$ is the number of questions asked at the meeting. $LENGTH_{i,t}$, is the length of the annual meeting in minutes. $DAY_{i,t}$ is a variable that takes the value of one if the annual meeting is held on the mode date for the date, 0 otherwise. $SPIKE_{i,t}$ is a dummy variable that takes the value of one if there is a "spike" for firm i at year t, zero otherwise). $LOGCAP_{i,t}$ is the log of the market capitalization (PACAP item MKTVAL) at the end of the month when the annual meeting occurs. $ROA_{i,t}$ is the ratio of PACAP item INC9 to PACAP item BAL9. $LOSS_{i,t}$ is a dummy variable that takes the value 1 if the net income (PACAP item INC9) is negative, 0 otherwise. $FIRMRET_{i,t-1}$ is the firm yearly return (PACAP item DRETWD) including the month when the annual meeting occurs and the 11 preceding months. $TIME_t$ is a time trend. $\Delta SHR_{i,t+1}$ is the absolute value of change in the total number of shares divided by the number of shares at t-1. $\Delta ASSET_{i,t+1}$ is the absolute value of the change in total assets divided by total assets at t-1. $LAMBDA_{i,t}$ is the inverse of the Mills ratio obtained from the first step regression.

$$\Delta CHAR_{i,t+1} = \beta_0 + \beta_1 SPIKE_{i,t} + \beta_2 \Delta LOGCAP_{i,t+1} + \beta_3 \Delta ROA_{i,t+1} + \beta_4 \Delta LOSS_{i,t+1} + \beta_5 \Delta FIRMRET_{i,t+1} + \beta_6 \Delta SHR_{i,t+1} + \beta_7 \Delta ASSET_{i,t+1} + \beta_8 LAMBDA_{i,t} + e_{i,t}. \quad (3)$$

We report the results in Table 4. To conserve space, we do not tabulate the results from the first specification but all specifications indicate meetings following a "spike" become more active: more questions are asked at the meetings, more shareholders

Table 5 - Analysis of Synchronicity.

	$\Delta SYNCH_{i,t+1}$	$\Delta SYNCH_{i,t+1}$
INTERCEPT	12.67	-1.38
	(3.12)	(-5.61)
$SPIKE_{i,t}$	-41.87	-60.21
	(-4.78)	(-6.18)
$TIME_t$	-0.75	
	(-14.55)	
$\Delta LOGCAP_{i,t+1}$		3.08
		(8.98)
$\Delta ROA_{i,t+1}$		1.45
		(0.58)
$\Delta LOSSi_{,t+1}$		-0.86
		(-2.61)
$\Delta FIRMRET_{i,t}$		-4.15
		(-16.69)
$\Delta SHR_{i,t+1}$		0.28
		(2.37)
$\Delta ASSET_{i,t+1}$		5.41
		(4.24)
$LAMBDA_{i,t}$	16.40	23.65
	(4.66)	(6.04)
N	9,420	9,420

$SYNCH_{i,t}$ is the R^2 of the regression individual firm returns on the market and industry returns. $SPIKE_{i,t}$ is a dummy variable that takes the value of one if there is a "spike" for firm i at year t, zero otherwise). $LOGCAP_{i,t}$ is the log of the market capitalization (PACAP item MKTVAL) at the end of the month when the annual meeting occurs. $ROA_{i,t}$ is the ratio of PACAP item INC9 to PACAP item BAL9. $LOSS_{i,t}$ is a dummy variable that takes the value 1 if the net income (PACAP item INC9) is negative, 0 otherwise. $FIRMRET_{i,t-1}$ is the firm yearly return (PACAP item DRETWD) including the month when the annual meeting occurs and the 11 preceding months. $TIME_t$ is a time trend. $\Delta SHR_{i,t+1}$ is the absolute value of change in the total number of shares divided by the number of shares at t-1. $\Delta ASSET_{i,t+1}$ is the absolute value of the change in total assets divided by total assets at t-1. $LAMBDA_{i,t}$ is the inverse of the Mills ratio obtained from the first step regression. Coefficients for $\Delta PERC$ are multiplied by 100 for expositional clarity. Z-statistics are reported in brackets. Standard errors are corrected according to Maddala (1983).

attend, and meetings are less likely to be on the national meeting day. In other words, annual meetings become less perfunctory. Control variables unsurprisingly indicate that bigger firms attract more shareholders and that the average length of the meetings increases overtime.

Our results (not tabulated) are qualitatively similar when observations from firms subject to multiple "spikes" are included or when a "spike" is defined as lasting more than twice the average length of the meeting time for a given firm and more than thirty minutes (however, $SPIKEi,t$ becomes significantly positive in the second specification of the $\Delta LENGTH$ regression). Our results (nor results in 3.3.2, 3.3 and 3.4) are not affected when we include either $\Delta FOREIGN_{i,t}$ and $\Delta FIN_{i,t}$ or $\Delta DAY_{i,t}$ as additional control variables in the third specification.

When we consider the change between t+1 and t+2 or between t+2 and t+3, we do not observe a reversion to the mean. In fact, $SPIKEi,t$ is positive in the $\Delta ATTEND$, $\Delta PERC$, $\Delta MEETINGQ$, and $\Delta LENGTH$ regressions and negative in the ΔDAY regression (although the significance varies depending on the model considered). Finally, untabulated results from cross-sectional level regressions indicate that most of the meeting characteristics are below the average before the firm has experienced a long meeting but become either above or at the average after a "spike".

Table 6 - Analysis of Profitability.

	$\Delta ROA_{i,t+1}$	$\Delta ROA_{i,t+1}$
INTERCEPT	-0.77	-0.45
	(-0.39)	(-4.20)
$SPIKE_{i,t}$	9.39	14.53
	(1.97)	(3.34)
$TIME_t$	-0.02	
	(-0.66)	
$\Delta LOGCAP_{i,t+1}$		1.37
		(11.52)
$\Delta SHR_{i,t+1}$		0.04
		(0.68)
$\Delta ASSET_{i,t+1}$		-2.63
		(-4.63)
$LAMBDA_{i,t}$	-3.88	-5.90
	(-2.02)	(-3.38)
N	9,420	9,420

Z-statistics are reported in brackets. Standard errors are corrected according to Maddala (1983). Results for the industry dummies are omitted from column 1. Variables are defined in Table 3. Coefficients are multiplied by 100 for expositional clarity.

5.1.2 The Effect on Synchronicity

We compute *SYNCHi,t*, the R^2 of the following regression run on a calendar year basis:

$$R_{i,d} = a_1 + b_1 \, TOPIX_d + b_2 \, INDRET_d + e_{i,d} \quad (4)$$

where *Ri,d* is the return for firm i on day d, *TOPIXd* is the return from the TOPIX index on day d, and *INDRETd* is the industry return on day d as reported by PACAP.[25] We then use the three specifications described in 3.3.2. The results reported in Table 5 indicate that long meetings lead to subsequent decreases in synchronicity. This is robust to including firms with multiple long meetings in the second specification or changing the definition of a long meeting to twice the average length. Control variables suggest that synchronicity increases with size but declines with past returns and losses. There is also a general trend toward a reduction of synchronicity. Untabulated results from a cross-sectional level regression indicate that the synchronicity is higher than the average before a "spike" but becomes indistinguishable afterward.

5.1.3 The Effect on Profitability

We then consider the effect of a "spike" on profitability. To do so, we regress *ROAi,t* (or *ΔROAi,t+1*) and *LOSSi,t* (or *ΔLOSSi,t+1*) using the three specifications previously described.[26] To conserve space, we only tabulate the results of the second and third specifications when *ΔROAi,t+1* is the dependent variable. Results in Table 6 indicate

[25] We delete firm-year observations where less than 50 data points are available to calculate the R2.

[26] We also consider the log of the ratio of asset to market value. In the second and third models that control for endogeneity (where *LAMBDA* is significant), a "spike" is strongly associated with a decrease in the ratio but *SPIKE* is insignificant in the fixed effect regression. In addition, our results are unaffected when the ratio is used as an additional control variable in our different regressions.

Table 7 - Effect on Shareholder Composition.

	$\Delta FIN_{i,t+1}$	$\Delta FOREIGN_{i,t+1}$	$\Delta FIN_{i,t+1}$	$\Delta FOREIGN_{i,t+1}$
INTERCEPT	3.44	0.05	-0.28	0.54
	(1.74)	(0.03)	(-2.40)	(6.80)
$SPIKE_{i,t}$	-33.49	22.89	-37.62	16.29
	(-7.88)	(6.43)	(-8.22)	(5.14)
$TIME_t$	-0.37	-0.16		
	(-15.01)	(-7.48)		
$\Delta LOGCAP_{i,t+1}$			2.92	2.57
			(18.11)	(22.98)
$\Delta ROA_{i,t+1}$			0.04	0.46
			(0.03)	(1.03)
$\Delta LOSS_{i,t+1}$			-0.40	0.04
			(-2.57)	(0.39)
$\Delta FIRMRET_{i,t}$			-1.23	-0.85
			(-10.87)	(-10.56)
$\Delta SHR_{i,t+1}$			0.12	-0.04
			(2.12)	(-1.07)
$\Delta ASSET_{i,t+1}$			0.70	1.34
			(0.17)	(3.25)
$LAMBDA_{i,t}$	13.13	-9.32	14.74	-6.63
	(7.69)	(-6.52)	(8.02)	(-5.22)
N	9,420	9,420	9,420	9,420

$FOREIGN_{i,t}$ is the percentage of foreign shareholders (item JAF79 scaled by the total number of shares, JAF81), *$FIN_{i,t}$* is the percentage of shares held by financial institutions (item JAF76-77, scaled by JAF81). Z-statistics are reported in brackets. Other variables are defined in Table 3. Standard errors are corrected according to Maddala (1983). Results for the industry dummies are omitted from column 1 and 2. Coefficients are multiplied by 100 for expositional clarity.

that a "spike" is the precursor of an improvement in ROA.[27] When we consider the change between the year prior to the "spike" and the average of the following three years, *SPIKEi,* is significantly positive (results not tabulated).[28] In addition, *SPIKEi,t* becomes strongly significant across all specifications in the *ΔROA* regression when the change between t+1 and t+2 or t+2 and t+3 is considered (the z-statistic for *SPIKEi,t* is greater than 5). In the *ΔLOSS* regressions, *SPIKE*i,t is negative in later periods (although the significance disappears in some specifications). Additional untabulated results also indicate that firms sell a significant amount of assets. These sales do not appear to be designed to artificially increase reported earnings but instead often trigger a loss in the year of the restructuring.[29] In other words, the improvement is due, at least in part, to the disposal of non-performing assets and a reduction in over-investment.

5.1.4 The Effect on Shareholder Composition

Finally, we consider the impact on shareholder composition. We run the three specifications previously described using the percentages of ownership of financial

[27] Only two firms that had long meetings and should otherwise be included in our sample were delisted in the subsequent year due to bankruptcy. This suggests that our results are not driven by survivor bias.

[28] However, the variable is not significant in the fixed effect regression, perhaps because of the lack of control for endogeneity (LAMBDA is significant in the two step regression).

[29] Note, however, that the occurrence of loss is affected by both the economic performance of the firm and of the accounting policy. If the firm becomes more forthcoming with bad news, the likelihood of accounting loses may increase, even though the true profitability is increasing.

Table 8 - Cross-sectional Effect of $DAY_{i,t}$.

	$LENGTH_{i,t}$	$ATTEND_{i,t}$	$PERC_{i,t}$	$MEETQ_{i,t}$
INTERCEPT	-12.76	-381.44	3.673	-2.33
	(-6.95)	(-21.34)	(36.14)	(-11.84)
$DAY_{i,t}$	-1.95	-15.28	-0.49	-0.18
	(-4.34)	(-5.03)	(-12.14)	(-2.69)
$LOGCAP_{i,t}$	3.96	44.66	-0.21	0.26
	(19.33)	(36.38)	(-19.37)	(9.67)
$ROA_{i,t}$	-25.63	-228.60	1.45	-1.74
	(-6.18)	(-4.74)	(6.38)	(-6.49)
$LOSS_{i,t}$	1.85	2.76	-0.28	0.12
	(3.08)	(0.77)	(-15.97)	(2.55)
$FIRMRET_{i,t-1}$	-2.16	-19.20	0.09	-0.08
	(-1.63)	(-2.79)	(2.48)	(-0.99)
R^2	10.52	22.92	12.81	6.86
N	12,566	12,566	12,566	12,566

	$ROA_{i,t}$	$LOSS_{i,t}$	$SYNCH_{i,t}$	$FIN_{i,t}$	$FOREIGN_{i,t}$
INTERCEPT	-6.81	80.29	-0.66	-0.30	-19.43
	(-9.02)	(19.37)	(-11.74)	(-18.94)	(-9.37)
$DAY_{i,t}$	-0.54	3.23	0.04	0.05	-1.45
	(-1.97)	(1.76)	(11.60)	(19.36)	(-7.83)
$LOGCAP_{i,t}$	0.76	-6.24	0.08	0.06	2.43
	(12.31)	(-17.42)	(13.21)	(31.83)	(10.62)
$ROA_{i,t}$			-0.18	-0.06	3.94
			(-2.44)	(-2.18)	(1.36)
$LOSS_{i,t}$			0.01	-0.01	0.41
			(1.44)	(-4.57)	(1.68)
$FIRMRET_{i,t-1}$			-0.05	-0.03	0.21
			(-3.63)	(-7.73)	(0.34)
R^2	5.16	6.17	46.62	30.43	20.63
N	12,566	12,566	12,566	12,566	12,708

Z-statistics are reported in brackets; all standard errors are robust and allow for clustering of observations by year. Coefficients for *PERC, FIN, FOREIGN, ROA* and *LOSS* have been multiplied by 100 for expositional clarity. $ATTEND_{i,t}$ is the number of shareholders attending the annual meeting of firm i at time t. $PERC_{i,t}$ is the percentage of shareholders attending the annual meeting. $SENTQ_{i,t}$, is the number of questions sent by mail to the firm before the annual meeting,. $MEETQ_{i,t}$ the number of questions asked at the meeting. $LENGTH_{i,t}$ the length of the annual meeting in minutes. $FOREIGN_{i,t}$ and $FIN_{i,t}$ are shares owned by foreigners (item JAF79) or by financial institutions (item JAF76-77) scaled by total number of shares (JAF81). $LOSS_{i,t}$ is a dummy variable that takes the value 1 if the net income (PACAP item INC9) is negative, 0 otherwise. $SYNCH_{i,t}$ is the R^2 of the regression of individual on market and industry returns. $DAY_{i,t}$ is a variable that takes the value of one if the annual meeting is held on the mode date for the date, 0 otherwise. $LOGCAP_{i,t}$ is the log of the market capitalization (PACAP item MKTVAL) at the end of the month when the annual meeting occurs. $FIRMRET_{i,t-1}$ is the firm yearly return (PACAP item DRETWD) including the month when the annual meeting occurs and the 11 preceding months.

institutions and foreign investors as dependent variables. To conserve space, we only tabulate the results for the endogenous specifications. Results reported in Table 7 indicate the percentage held by financial institutions decreases as foreigners buy more stocks. This is also true when the change s between t+1 and t+2 or t+2 and t+3 are considered.

5.2 The Effect of Meeting Clustering

Overall, these empirical results suggest long meetings and activism have positive effects. In fact, the policy of encouraging firms to hold their meetings on the same day may be counterproductive. Surveys indicate that Japanese mutual fund managers

consider that the concentration of meetings prevents them from effectively lobbying firms to improve corporate governance (Omura [1998]). To analyze the effect of meeting clustering, we estimate cross-sectional regressions where the treatment variable is whether the firm has its annual meeting on the national day or not. Results reported in Table 8 indicate that firms that have their annual meetings on the national day tend to have shorter meetings and with fewer shareholders attending, asking fewer questions. They also have a higher synchronicity, a lower ROA and a higher likelihood of suffering from losses. They attract fewer foreign or individual shareholders. Results (not reported) are qualitatively similar when we use a treatment effect model (to control for the endogeneity of the annual meeting date) instead of cross-sectional regressions,[30] when we cluster observations by firms instead of years or when we use a SUR specification. These results and the fact that firms that have their meetings on the national meeting day are less likely to be targeted by activists (Table 2, column 1) also suggest that underperforming Japanese managers strategically use the perceived threat of the *sôkaiya* to protect themselves by clustering their meetings. In contrast, this does not support the argument that managers choose to have long meetings to disclose more information to reassure their shareholders before improving the administration of their firms. It does suggest that the policy of supporting the clustering of meetings should be reversed by the Japanese authorities.[31]

6. Conclusion

Prior research on whether shareholder activists can force managers to improve their behavior provides mixed results. In Japan, however, alternative channels for improvement are not as effective as they are in the U.S. Thus, challenging the management during annual meetings may be the only option for disgruntled shareholders in Japan to exert pressure. Hence, this provides a more powerful setting to study this question. Yet, the situation is complicated by the existence of corporate racketeers who disrupt these events to blackmail managers. Anecdotal evidence and results from surveys suggest that this form of corporate racketeering is prevalent in Japan. In response, the authorities have taken various measures to reduce the importance of annual meetings to minimize the influence of organized crime. Yet, this policy comes at the expense of legitimate shareholder activism.

Empirical results indicate meetings following a "spike" become more active. In addition, the synchronicity of the firm with the rest of the exchange declines, suggesting more firm-specific information is incorporated. Contrary to most results obtained in the U.S., the ROA improves, in part because of the disposal of non-performing assets. Finally, the percentage of shares held by foreign investors increases, while the

[30] We use $SPIKE_{i,t}$, market returns, industry dummies and log of asset in the first stage.

[31] It is possible, however, that the *sôkaiya* had already taken control of all the firms they could before 1991. If this is true, such firms may not appear in our sample of "spikes" but *sôkaiya* may still exert an influence. Thus, the policy recommendation may be reversed if this is the case and several additional conditions are met: there is an exogenous departure from the equilibrium at some point in the future, the clustering prevents *sôkaiya* from reverting back to the current equilibrium and the cost of preventing this hypothetical return is less than the cost imposed by the restrictions of legitimate activism. However, we have no empirical support for such a scenario.

percentage held by financial institutions decreases. These results are robust to control for endogeneity. Overall, these results suggest that shareholder activists are able to capitalize on the embarrassment caused by long meetings to improve governance. The fact that prior literature found mixed results on the ability of activists to play a significant role may be due to the difficulty to identify their marginal effect in a setting where investors have numerous avenues of recourse against managers.

At the same time, Japanese managers appear to be strategically using the threat of organized crime as a way to reduce legitimate outside pressure. Firms having their meetings on the national meeting day are less likely to be targeted by activists. They also under-perform in terms of profitability and governance. Not surprisingly, they have more financial institutions among their shareholders but fewer foreign shareholders. These results suggest that the policy of protecting managers against shareholder activists should not be supported by the authorities.

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Operating Performance of Japanese Firms with Large Cash Holdings during the Bubble Economy

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ABSTRACT

The existing literature posits that large corporate cash holdings might induce agency problems and thus hinder firms' operating performance. This paper investigates how Japanese firms maintain high/low cash holding position during the late 1980s and early 1990s. I find that firms pile cash because there is no profitable project. On the other hand, firms maintain a low cash holding position due to over-investing. I also find that excess cash holdings significantly affect firms' operating performance. Lastly, I find no direct evidences that ownership structure affect firms operating performance.

Keywords: cash, operating performance, bubble economy, Japan

1. Introduction

Cover story of the weekly Nikkei Business January 24 2005 issue features the "cash rich firms" in Japan. According to Nikkei Business, 34 Tokyo Stock Exchange (TSE) 1st-section listed firms recorded more than 100 billion Japanese Yen (roughly 1 billion US dollar) of net cash[1] in the March 2004 filings. Nikkei Business further points out that these cash rich firms were holding more cash in hand compared to their cash holdings during the bubble economy in the late 1980s. Another interesting figure points out by Nikkei Business was that 573 out of 1448 or 39.6% TSE 1st-section listed firms did not have any interest bearing debt.

The finance academic has long noticed that Japanese firms hold a lot more cash than their counterparts in other countries. According to Ranjan and Zingales (1995), the average cash to assets ratio of Japanese industrial firms was nearly twice as much among firms in any other G7 countries in 1991. Pinkowitz and Williamson (2001) also found that Japanese firms held more cash than U.S. or German firms in the years of 1974 to 1995. Dittmar, Mahrt-Smith, and Servaes (2003) document that average cash holding ratio of Japanese firms was the de facto highest among firms from other 45 countries in 1998.[2]

In the late 1980s, the Japanese bubble economy burst with plummeted stock prices. It has been generally recognized that the 1990s was the decade of recession to the

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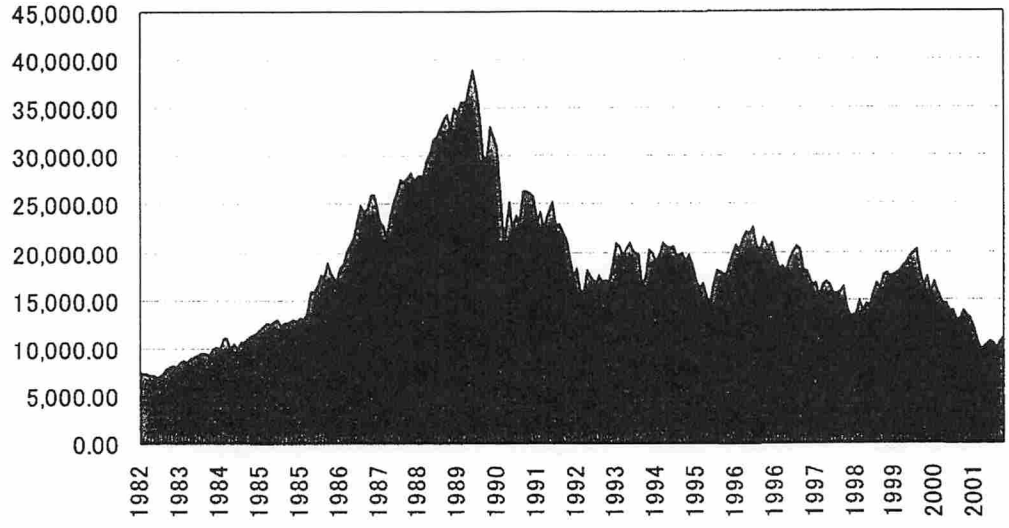
[1] Nikkei Business defines "Net Cash" as "cash and deposits + short-term marketable securities - interests bearing debts." Nikkei Business acquired the data from the Nikkei Economics Electronic Databank System – FinancialQUEST (NEEDS-FQ). This paper uses the same data resource with Nikkei Business.

[2] In Dittmar, Mahrt-Smith, and Servaes (2003), only Egyptian and Israeli firms, on average, hold more cash than Japanese firms. However, their sample includes only 6 Egyptian and 37 Israeli firms. This is not comparable to other 1853 Japanese firms in the sample.

Figure 1 - Nikkei Stock Index (Monthly Closing Prices)



Data source: Public Statistics of Bank of Japan.
URL of file: http://www2.boj.or.jp/en/dlong/etc/data/ehstock.csv

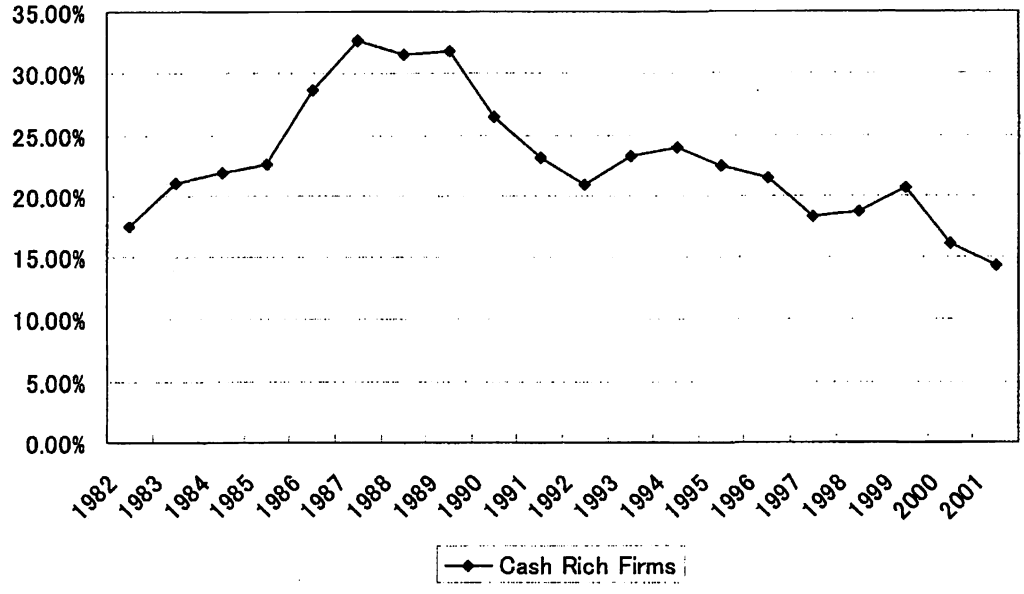
Japanese economy. Market value of the firms listed in the TSE reached its peak in December 1989 but soon plunged over 25% in value in only three months and further lost 45% of its total value in the following year. Figure 1 illustrates the Monthly Nikkei Index from 1982 to 2001. The over-heated prosperity, however, was believed to have lasted because the stock market index soon rebounded over 12.5% in prices in the following year.

The evidence Ranjan and Zingales (1995) document should not be a surprise. It is understandable that Japanese firms might hold more cash than they need with the rapid expanded economy in the late 1980s. The obvious question is, as indicated in Dittmar, Mahrt-Smith, and Servaes (2003), why cash balances of Japanese firms in 1998 were still higher than their counterparts in most countries. Dittmar, Mahrt-Smith, and Servaes (2003) apply the measures developed in La Porta, Lopez-de-Silanes, Shleifer, and Vishny (hereafter LLSV, 1997 and 2000) and find that firms hold less cash in countries with good shareholder protections. Hence, it is interesting that Japanese firms, while under the well-established shareholder protection legal system, have so much cash in hand.

The existing literature (e.g., Jensen [1986], Blanchard, Lopez-de-Silanes, and Shleifer [1994], and Harford [1999]) posits that large cash holdings can to some extent relieve managers' disciplinary pressures and thus induce the managers to spend more cash on less profitable investments. On the contrary, managers of firms with large cash holdings feel that having cash handy is easier to fund large capital expenditures on profitable investments for that internal financing costs less than external financing, i.e., they can enjoy lower costs of capital.

Among these, Mikkelson and Partch (2003) believe that large cash holdings do not necessarily thwart the firm values and show that persistent large cash reserves support

Figure 2 - Ratio of the Cash Rich Frims in the Market



investments without hindering corporate performance. In other words, they find no evidence to support that stockholders' rights are being sacrificed for firms that hold persistent large cash.

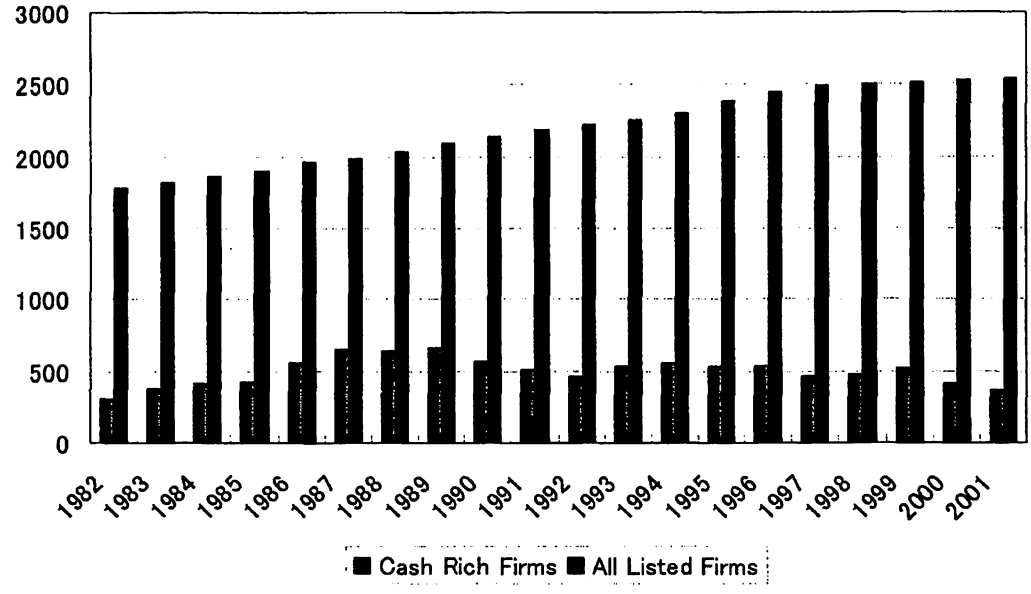
Following the cash rich criterion in Mikkelson and Parth (2003), I document the cash rich TSE-listed firms into two figures. Cash rich firms in Mikkelson and Parth (2003) are defined as the sums of cash and deposits + market securities that compose more than 25% of the firms' assets.

Figure 2 illustrates the percentage of cash rich TSE-listed firms to all firms listed in the TSE. In Figure 2, it is obvious that the number of cash rich firms sharply increases in 1986 and suddenly drops in 1990. This fact might suggest that during the bubble firms chose to hold large portions of cash in their assets. However, Figure 3 tells a slightly different story. The actual number of the rich firms went up to 663 firms during the bubble economy, and stayed on about 500 firms in the 90s.

These two figures reveal that there are considerable amounts of Japanese firms being cash rich. In addition, Figure 3 also reveals an interesting fact that the numbers of cash rich firms did not decrease in the post bubble period. Thus, some interesting questions come into attention; why Japanese firms keep so much cash, and if this cash deteriorates Japanese firms' performance?

First, I explore what financial factors might be the possible determinants for firms' high cash holdings. The restrictions are based on the concern that Japanese firms might have possessed more cash than they needed simply for the booming prosperity during the bubble economy. Thus this analysis benefits from setting cutoff point at the end of bubble economy. Next, I compare the corporate performance of the high cash firms and the low cash firms to see how the performance differs and changes across the late 1980s and early 1990s. At last, I explore the possible explanations to the variations in

Figure 3 - Cash Rich Firms in the Market



performance among firms with large cash holdings.

I find that firms that maintain high cash holding position accumulate cash within the firm because these firms do not have promising growth prospect during the bubble economy. On the other hand, firms that maintain low cash holding position are over-powered by the banks. These low cash firms are highly leveraged and pay out more cash dividends.

The evidences also show that excess cash significantly hinders the operating performance of firms with large cash in hand. On the other hand, excess cash holdings significantly improve the operating performance of firms with low cash to assets ratio. I also find evidences that ownership structure have little relation with operating performance.

This paper contributes to the literature in the following ways. First, this paper distinguishes the different cash holding determinants from high cash firms to low cash firms. This paper confirms the relations between cash holdings and the operating performance. This paper also contributes to the literature showing that excess cash holdings hinder the operating performance of Japanese firms with persistent large cash holdings while improve the operating performance of Japanese firms with persistent low cash holdings.

Layouts of this paper are as follows. Section 2 discusses more related literature in detail to explore what makes Japanese firms keep so much cash within the firms. Section 3 describes the process of sample selection and defines the variables to be used in this study. Section 4 presents the descriptive statistics of the firm characteristics and performances. Section 5 constructs the research designs and also provides an analysis on the determinants of cash holdings which estimates excess cash holdings and the effects on performance from holding excess cash. Section 6 interprets the empirical

results and also performs additional examinations. Section 7 summarizes the findings and concludes the paper.

2. Why Japanese Firms Keep Large Cash in Hand?

Existing literature documents considerable amount of theoretical frameworks to explain firms' motives to keep large cash in hand. Managers' desires to keep the money within the firm can be explained to be risk averse or simply to avoid market discipline as Easterbrook (1984) posits that frequent accesses to the capital market help control the agency conflict between shareholders and managers. Ignoring the fact that cash piling can be simply for the managers' personal interests, however, it is also argued that a substantial cash reserve can better serve shareholders' interests by replacing the costly external capital financing.

In the presence of the conflicts of interests between shareholders and managers, large cash holdings create managerial incentives that may lead managers to invest unproductively than to distribute to shareholders. What the existing literature has documented can be perceived in either two sides of the explanations. This section is to discuss some evidences on factors that might contribute to Japanese firms' high cash account balance and specify the questions being addressed in this paper.

2.1 Monopoly Power of the Banks

As being reported in Ranjan and Zingales (1995), Pinkowitz and Williamson (2001), and Dittmar, Mahrt-Smith, and Servaes (2003), the average cash holding ratio of Japanese firms are among the highest compared to other developed counties. However, what is interesting is that the Japanese firms operate their business in much different way from the existing literature posits.

Adopting measures developed by LLSV (1997, 2000), Dittmar, Mahrt-Smith, and Servaes (2003) find that firms hold twice as less cash in countries with better legal system for investor protections. However, even with good quality of law enforcement and comprehensive legal framework, firms in Japan still hold twice as more cash than firms in other countries that also with sound shareholder protections. What LLSV (1997, 2000) have concluded does not explain the situation in Japan.

One important fact that LLSV (1997, 2000) have addressed is why Japan, being the second largest economy in the world, has such extensive banking systems. The fact is that, being the second largest economy in the world, it was not until the 1980s that Japan became a capital surplus economy. Since, Japan's unique *main bank* system has dominated the market. Bank borrowings have been the main capital source for the Japanese firms before 1980. High level of intercorporate cross-holding and bank equity ownership have been important and distinct features of the Japanese business environment.

Ikeo and Hirota (1991) argue that the main bank system helps decrease firms' agency costs arise from the debts in Japan. They provide empirical evidences and argue that the main bank leads firms' debt ratio to rise. However, if the existence of main bank helps mitigate the agency problem in Japan, there is no reason for Japanese firms to maintain such high cash to assets ratio.

Germany also has a bank-centered financial system, but German firms do not have

comparable cash holding level to Japanese. Pinkowitz and Williamson (2001) argue that it is the banks that force Japanese firms to hold so much cash. It is the monopoly power of the Japanese main bank system that affects firms' cash accounts. They argue that the powerful Japanese banks persuaded firms to hold large cash in order to extract rents, as the evidences show, that cash holdings of Japanese firms declined as the bank power getting weak over time.

Intensive bank presence also influences the managements of Japanese firms in many aspects. Morck, Nakamura and Shivdasani (2000) show evidences that, in some specifications, firm value rises as bank equity ownership rises in Japan while Yermack (1996) provides evidences that companies with small board of directors receive better market valuation.

2.2 Low Degrees of Capital Market Disciplines

Managers in Japan suffer less pressure from the capital market. Instead, they are under greater pressure from the banks, particularly their main banks. Capital market disciplines are rare in Japan. Lack of capital market discipline is usually perceived as a result of the intensive bank systems in Japan. Shleifer and Vishny (1986) argue that large independent shareholders, if they exist, make takeovers and proxy contest easier; therefore, the firm is expected to hold excess cash where outside shareholders are highly dispersed. Other conditions where firms are expected to hold excess will be if the firms are large firms, firms with low debt, and firms are preparing for anti-takeover operations are expected to hold excess cash.

Shleifer and Vishny (1989) provide a model of managerial entrenchment that managers can strategically make some manager-specific investments to avoid being replaced by shareholders. In Japan, such entrenchment efforts are less important because such efforts can be offset by main banks directly sending their own people into the firms' board of directors. Also, Morck, Nakamura and Shivdasani (2000) argue that high level intercorporate cross-holdings and large bank equity ownership serve the hostile takeover deterrents in Japan. Stock repurchases were made to be legally available in 1997 for managerial stock option preparations. And stock repurchases were made generally available for Japanese firms as a financial tool in 2002. Nevertheless, we should not expect the capital market disciplinary managerial turnovers that Mikkelson and Partch (1997) argue can be seen in Japan.

In other stream of the cash holding related researches, Harford (1999) find that firms with large cash reserves usually undertake underperformance acquisitions. He argues that these firms overpay the target firms when acquiring them. Kruse, Park, Park, and Suzuki (2003) find that merge and acquisition being undertaken within the *keiretsu* usually lead to improvements in performance. Therefore, they argue that Japanese firms merge to increase diversifications. Usui (2001) argues that hostile takeovers are rarely seen in Japan. He, however, also points that the increasing merge and acquisition activities in the late 1990s have given certain degrees of managerial pressures to firms to seek efficiencies.

3. Sample and Data Descriptive Statistics

The purpose of this paper is to investigate if large corporate cash holdings deteriorate

managerial performance. There have been considerable amounts of corporate cash holding related research already being documented in the existing literature. However, studies of the sustained significant cash holdings over a long period of time are rarely conducted. The paper aims to shed some lights on the relations of large cash holdings and operating performance and contribute to the literature. To test the argument that if persistent large cash holdings deteriorate firms' operating performance, this paper examines firms that hold sustained amount of cash during the bubble economy in 1986-1990.

3.1 Sample Selection and Data

I acquire the financial data from the Nikkei Economics Electronic Databank System - FinancialQUEST (NEEDS-FQ). All TSE 1st-section listed firms are included in the sample except for the financial institutes and regulated utilities firms. At this point, the average cash holding ratio of the TSE 1st-section firms is 20.24% (out of 13,004 observations) in 1986-1995. The average cash holding ratio drops to 19.22% (out of 27,147 observations) if the time span is extended to 1980-2000.

Following Mikkelson and Partch's (2003) large cash holding definition (cash to total assets ratio in excess of 25%),[3] I select firms that have maintained being high cash position for 5 consecutive years from 1986-1990 at the end of each fiscal year. To highlight cash rich firms' high cash position policy, I use firms that maintain low cash to total assets ratio for comparison. I select firms that have maintained cash to total assets ratio of less than 15% for 5 consecutive years from 1986-1990 at the end of each fiscal year.[4] After excluding firms with missing values for stock prices, I obtain a sample consists of 140 high cash firms and 91 low cash firms.

As the result, the sample includes 11% of firms whose cash holding ratio falls in the highest end of the total TSE 1st-section listed firms and 9% of firms whose cash holding ratio falls in the lowest end of the total TSE 1st-section listed firms.[5] Therefore, the sample includes firms that have had established sustained high and low cash holding policy.

3.2 Definition of Key Variables

The selection of variables is adapted from Pinkowitz and Williason (2001). The same variable composition is used to estimate the Japanese firms' cash holding level in Pinkowitz and Williason (2001).[6]

Cash is the ratio of cash to operating assets. Cash is defined as "cash and deposits +

[3] Mikkelson and Partch (2003) do not explain the reason why they use the 25% cash to assets ratio to define large cash holding firms. Also, they do not provide any evidence showing that their results will not change once the 25% definition does not stand hold.

[4] At this point, I obtain 169 high cash firms and 128 cash firms. When I set the cash holding restrictions to more than 30% and less than 10%, then the sample comprises 102 high cash firms and 34 low cash firms. If the consecutive cash holding restriction is set to 10 years, then it will be 46 (more than 30%) or 95 (more than 25%) high cash firm, and 99 (less than 15%) or 26 (less than 10%) low cash firms.

[5] 1,197 TSE 1st-section listed firm data are available for computing cash to total assets ratio in 1986.

[6] The variable composition in Pinkowitz and Williason (2001) is originally from Opler, Pinkowitz, Stulz, and Williason (1999). Opler, Pinkowitz, Stulz, and Williason (1999) develop the corporate cash holding determining model using the U.S. data. Pinkowitz and Williason (2001) argue that if Japanese banks' monopoly power determines the level of Japanese firms' cash holding by modifying Opler, Pinkowitz, Stulz, and Williason (1999). Dittmar, Mahrt-Smith, and Servaes (2003) also use Opler, Pinkowitz, Stulz, and Williason (1999) for an international comparison of corporate cash holdings.

marketable securities."[7] I use operating assets as the scaling factor in an effort to eliminate the possible endogenous impacts of cash. This paper is to estimate the effects of cash. The intended dependent variable will be the ratio of cash. If every variable is scaled by total assets, the cash component of total assets will correlate the dependent variable to each independent variable and thus none of the variable will be identically and independently distributed. Hence, instead of using total assets as the scaling factor, I deflate most key variables in this study using operating assets. The operating asset is defined as "total assets - cash and deposits - marketable securities," i.e., "total assets minus *cash.*"[8]

To measure the firm size, I take the natural logarithm of the book value of total assets. Total leverage is measured using the debt-to-assets ratio defined as "(short-term debt + long-term debt)/book value of assets."

I use the market-to-book ratio to measure firms' growth opportunities.[9] The market-to-book ratio is defined as "(market value of equity + book value of debt)/book value of assets." A firm's book value of assets reflects a firm's book value of cumulated assets, but it does not include a firm's growth option. Thus, a firm's market value relative to the book value should proxy for its growth options.

In order to examine firms' investment policy, I measure firms' capital expenditures. Since there is no direct access to Japanese firms' flow of funds statements in the late 1980s,[10] I use "annual change in fixed-assets + depreciation" to proxy for the capital expenditures. Cash flow is defined as "ordinary income - interest expense and discount charges - income taxes - cash dividends."

Net working capital is used to control for alternative sources of liquidity. The commonly used definition of net working capital is referred to as the "difference between a firm's current assets and current liabilities." However, the dependent variable used to estimate firms' level of cash holdings is the ratio of cash. Regressing cash on net working capital using the above net working capital with cash definition without any treatment might cause multicollinearity problem. Therefore, to insure eliminate possible econometrical problem, I measure the net working capital as "current assets - current liabilities - *cash.*"[11]

Net working capital is an indicator of a firm's abilities to pay back its short-term liabilities. Another reason why I estimate net working capital without cash is because such it performs better in determine a firm's cash holding level. Suppose a firm is not able to cover its account payables with its account receivables, then it has to finance the deficits. In such case, the firm will have to cover such deficits with its cash. In other

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[7] The definition of "cash" or "cash holding" for Japanese firms varies from study to study. Cash is define as only "cash in hand" in Pinkowitz and Williason (2001); "cash and deposits + marketable securities" in Dittmar, Mahrt-Smith, and Servaes (2003); and "cash and deposits + short-term marketable securities - interests bearing debts" in the Weekly Nikkei Business.

[8] Pinkowitz and Williason (2001), Opler, Pinkowitz, Stulz, and Williason (1999) and Dittmar, Mahrt-Smith, and Servaes (2003) use the same measure to define the term "net assets" or "assets" in their study.

[9] See Smith and Watts (1992) and Barclay and Smith (1995) for details on market-to-book ratio as the growth opportunities proxy.

[10] Statement of cash flow was not required by the Japanese General Accepted Accounting Principles (GAAP) until March 2000.

[11] Opler, Pinkowitz, Stulz, and Williason (1999) and Pinkowitz and Williason (2001) exclude cash from net working capital so that net working capital without the impact of cash can be examined.

words, net working capital without cash is an indicator of a firm's needs of cash financing.[12]

I exclude research and development expenses (R&D) from the variable selection because the number of missing values may inevitably affect the results. Since the bubble economy in the late 1980s was characterized with the soaring Nikkei stock index, I add the value of investing securities as an independent variable to control for firms' speculation in the stock market. This is because that profitable a firm with no potential investing opportunity might possibly play the money game in the stock market during the bubble economy.

4. Descriptive Statistics of Variables

4.1 Descriptive Statistics of the Firm Characteristic Variables

Table 1 summarizes the statistics of key variables on firms' characteristics. Table 1 presents the descriptive variable of characteristics of the high cash firms and low cash firms from 1986 to 1990. Table 1 also presents the univariate comparisons using t-test and non-parametric Wilcoxon test to compare the differences between means and medians respectively of both high cash firms and low cash firms.

In Table 1, it is obvious to find out that the characteristics of high cash firms are significantly different from the low cash firms except for the growth opportunities. The differences in the market-to-book ratio are only statistically significant at the 10% significant level.

High cash firms' mean *cash* ratio is more than 6 times greater than the low cash firms' mean cash ratio. This is because the reported cash ratio in Table 1 is deflated using "assets without cash" while the deflator used to deflate cash at the sampling is "total assets." Not surprisingly, the high cash firms have less total assets and sales than the low cash firms.[13]

High cash firms also have more cash flow and capital expenditures than the low cash firms. This indicates that high cash firms undertake more investments and acquire more tangible assets. Note that the reported mean and median of cash flow in Table 1 are negative. This is because Japanese firms were not required to file flow-of-funds statements until the March 2000 fiscal year so that cash flow in this study is estimated from the balance sheet items.

Table 1 reports negative net working capital. This is because net working capital is defined without *cash* (i.e., current assets - current liabilities - *cash*). The mean and median net working capital of high cash firms and low cash firms are -0.0746, -0.0349, and -0.0427, -0.0504 respectively. The mean net working capital of high cash firms is significantly than of the mean net working capital of low cash firms. On the other hand, the median net working capital is slightly (while not significantly) higher than the median net working capital of low cash firms.

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[12] The definition of net working capital without cash is very similar to the definition of operating working capital. See Palepu, Healy, and Bernard (1999) for detailed discussions on net working capital and operating working capital.

[13] This helps explain why the sampling results are similar whether the sampling definition is cash/assets or cash/sales.

Table 1 - Summary Statistics: 1986-1990.

Variable	High Cash Firms Mean (t-statistics)	High Cash Firms Median (z-statistics)	Low Cash Firms Mean	Low Cash Firms Median
Cash	***0.74213 (31.32)	***0.61862 (27.364)	0.11737	0.11843
Real Size (JPY)	***11.38663 (-13.01)	***11.09425 (-8.631)	11.69055	11.4008
Real Sales (JPY)	**11.2608 (-2.36)	**11.1857 (-1.649)	11.4383	11.3531
Market to Book Ratio	*1.87291 (1.71)	1.60160 (0.999)	1.76681	1.55000
Cash Flow	***0.04022 (15.63)	***0.03435 (16.289)	-0.00493	-0.00352
Net Working Capital	**-0.07455 (-1.98)	-0.03494 (0.879)	-0.04277	-0.05043
Capital Expenditures	***0.08202 (3.63)	**0.06995 (2.203)	0.06125	0.05717
Investing Securities	***0.07631 (8.24)	***0.06483 (8.825)	0.04908	0.03573
Total Leverage	***0.10326 (-19.56)	***0.06078 (-15.373)	0.29379	0.25126
Dividend	***0.00381 (7.84)	***0 (4.688)	0.00107	0
Short-term Debt	***0.14920 (-4.40)	***0.07164 (-10.558)	0.20468	0.17965
Long-tern Debt	***0.03778 (-13.29)	***0.00679 (-12.002)	0.12357	0.07878
Bank Debt to Total Debt	***0.18034 (-16.85)	***0.14019 (-14.169)	0.37887	0.36904
Insider's Ownership	***0.03474 (5.82)	***0.00237 (4.336)	0.01547	0
Financial Institute Ownership	***0.16011 (3.63)	***0.08700 (4.336)	0.12129	0

*, **, and *** indicate variable differences from the low cash firm significant at 10%, 5%, and 1% level respectively. The t-statistics in the parentheses are produced by t-test; and z-statistics by non-parametric test. High cash firms are firms that persistently hold the ratio of cash to total assets in excess of .25 at the end of each of the years 1986-1990. Low cash firms are firms that persistently hold the ratio of cash to total assets less than .15 at the end of each of the years 1986-1990. The sample consists of 140 high cash firms and 91 low cash firms for each single year.

Definition of Variables: *Cash*: (Cash and Deposits + Marketable Securities) / Operating Assets. *Market to Book Ratio of Assets*: (Market Capitalization + Book Value of Debt) / Total Assets. *Operating Assets*: Total Assets - Cash and Deposits - Marketable Securities. *Real Size*: Natural Logarithm of the Total Assets. *Real Sales*: Natural Logarithm of Sales. *Cash Flow*: (Ordinary Income - Interest Expense and Discount Charges - Taxes - Dividends) / Operating Assets. *Net Working Capital*: (Current Assets - Cash - Current Liabilities) / Operating Assets. *Capital Expenditures*: (Change in Fixed Assets + Depreciation) / Operating Assets. *Investing Securities*: Investing Securities / Operating Assets. *Total Leverage*: (Short-term Debt + Long-term Debt) / Total Assets. *Dividend*: Cash Dividends / Operating Assets. *Short-term Debt*: Short-term Debt / Operating Assets. *Long-term Debt*: Long-term Debt / Operating Assets.

Mean and median net working capital with *cash* (i.e., current assets - current liabilities) of high cash firms are 0.6675 and 0.5853. On the other hand, mean and median net working capitals with cash of low cash firms are 0.0746 and 0.0665.[14] It is obvious that the financing components (cash and deposits, and marketable securities) consist of large portions of net working capital. Since, the net working capital without cash excludes the financing components; the operating components (such as accounts receivable, inventory, and accounts payable) will be examined to determine a firm's needs of cash financing.

[14] Summary statistics of net working capital with cash are not reported in any Table.

Table 2 - Panel A: Operating Performance of Firms with High/Low Cash Holdings, 1986-1990.

	High Cash Firms		Low Cash Firms	
	Mean (t-statistics)	Median (z-statistics)	Mean	Median
1986	***0.144991 (7.41)	***0.119832 (8.14)	0.036785	0.025898
1987	***0.142587 (8.36)	***0.119534 (8.68)	0.036068	0.026792
1988	***0.134372 (8.65)	***0.110998 (7.87)	0.045865	0.039832
1989	***0.133879 (8.33)	***0.115547 (7.61)	0.050011	0.037318
1990	***0.125921 (8.98)	***0.107591 (8.41)	0.046642	0.037622
1986-1990	***0.13635 (9.05)	***0.120011 (8.14)	0.043074	0.038376

*, **, and *** indicate variable differences from the low cash firm significant at 10%, 5%, and 1% level respectively. Operating performance is defined as ordinary incomes over operating assets (total assets - cash - marketable securities). The t-statistics in the parentheses are produced by t-test for the differences in means; and z-statistics by non-parametric test for the differences in medians. High cash firms are firms that persistently hold the ratio of cash to total assets in excess of .25 at the end of each of the years 1986-1990. Low cash firms are firms that persistently hold the ratio of cash to total assets less than .15 at the end of each of the years 1986-1990. The sample consists of 140 high cash firms and 91 low cash firms for each single year.

Table 2 - Panel B: Operating Performance of Firms with High/Low Cash Holdings, 1991-1995.

	High Cash Firms		Low Cash Firms	
	Mean (t-statistics)	Median (z-statistics)	Mean	Median
1991	***0.115397 (7.62)	***0.098576 (8.14)	0.041043	0.034861
1992	***0.094649 (5.68)	***0.071117 (6.26)	0.035927	0.029212
1993	***0.084017 (5.72)	***0.065235 (7.61)	0.025404	0.022881
1994	***0.074941 (6.31)	***0.061100 (7.07)	0.019330	0.016330
1995	***0.072957 (5.39)	***0.054174 (6.53)	0.022929	0.015746
1991-1995	***0.088392 (6.65)	***0.067728 (6.53)	0.028927	0.025964

*, **, and *** indicate variable differences from the low cash firm significant at 10%, 5%, and 1% level respectively. Operating performance is defined as ordinary incomes over operating assets (total assets - cash - marketable securities). The t-statistics in the parentheses are produced by t-test for the differences in means; and z-statistics by non-parametric test for the differences in medians. High cash firms are firms that persistently hold the ratio of cash to total assets in excess of .25 at the end of each of the years 1986-1990. Low cash firms are firms that persistently hold the ratio of cash to total assets less than .15 at the end of each of the years 1986-1990. The sample consists of 140 high cash firms and 91 low cash firms for each single year.

High cash firms also have lower debts compared to low cash firms. The evidences indicate that high cash firms have significant lower leverage ratio, and the amount of short-term debt, long-term debt and bank debt. Low debt holdings indicate low bank influences. Pinkowitz and Williason (2001) argue that if the banks have dominating power over the firms, there should not be any expected relation between firms' cash holdings and leverage.

Pinkowitz and Williason (2001) also argue that the reason why Japanese firms tend to keep the cash at hand is because the banks tell them to do so. When a Japanese firms'

main bank possesses monopolistic power over the firm, the main bank will force the firm to borrow from the bank and deposit those borrowed funds in the bank. Thus, while the bank is able to make more loans with those loan deposits, the bank is also able to extract more rents from the firm. Pinkowitz and Williason (2001) is not a likely story to fit into the picture of this study. Even though the regulation to limit banks' equity holding of any single firm from 10% to 5% was taken in to effect in 1977;[15] Pinkowitz and Williason (2001) argue that the main bank should influence smaller bank to effectively control over the firms after 1987.

Mean and median financial institute ownership of the high cash firms are 16% and 8% in 1986-1990. However, the median of the banks' ownership in 1991-1995 is less than 2% (see Table 6 Panel A). This indicates that the banks are not powerful enough to influence high cash firms as the banks used to be.

4.2 Descriptive Statistics of Operating Performance

Table 2 presents the operating performance of the selected firms in the sample in 1986-1995. Panel A reports the summary statistics in 1986-1900 while Panel B reports the summary statistics in 1991-1995. The operating performance is defined as the ratio of ordinary incomes over operating assets.

Following the treatment used in Table 1, I also test if the mean differences and median differences between high cash firms and low high cash firms equal to zero using t-test and Wilcoxon test. Table 2 reveals that the operating performances of high cash firms are significantly greater than the operating performances of low cash firms throughout 1986-1995. The mean and median performances of high cash firm are 3 times greater than the performances of the low cash firms in 1986-1990, and are 2.5 times in 1991-1995.

5. Research Designs

5.1 Simultaneous-Equation Model

The purpose of this study is intended to shed light on the relation between Japanese firms' corporate cash holding levels and the corporate operating performance. I use two-stage least squares (2SLS) method to address the concern of this study. The reason why I use 2SLS method for the analyses is to avoid the simultaneous problems. Firms must have good performance to generate more cash; then firms with more cash can perform better. Or firms with large holding have good performance; then the good performance generates more cash. However, it is hard to demonstrate a clear cause-and-effect relationship between cash and operating performance.

In this study, I assume that firms' cash holding levels in 1986-1990 are (positively/negatively) correlated to their operating performance in 1991-1995. I first estimate the normal cash holdings with the cash holding determinants reported in Table 1; then I regress operating performance on the predicted error (unexplained excess cash) from the first stage regression to find out if the excess cash interacts with the operating

[15] According to Pinkowitz and Williason (2001), the regulation grants the banks a 10 years grace period to disgorge the cross-holding of equity. Therefore, the bank can only hold the equity shares of a single firm up to 5% since 1987.

performance or not.[16]

5.2 Determinants to Expected Cash Holding Levels

The following expected cash holding level determining regression is from Pinkowitz and Williason (2001). Pinkowitz and Williason (2001) modify the set of cash holding determinants developed in Opler, Pinkowitz, Stulz, and Williason (1999) for the estimation of the relation between the banks' powers over Japanese firms' cash holding levels. Dittmar, Mahrt-Smith, and Servaes (2003) use Opler, Pinkowitz, Stulz, and Williason (1999) cash holding determinants for a cross-country comparison on the corporate cash holding levels among 45 countries.

Following Pinkowitz and Williason (2001), I estimate firms' cash holding levels from the size, growth opportunities, flow-of-funds, leverage, and payouts. I also incorporate the effects of speculations in the capital market. The estimate regression of the expected cash holding level is:

$$\begin{aligned} CASH_t = {} & \beta_0 + \beta_1 * MtoB_t + \beta_2 * RSize_t \\ & + \beta_3 * CF_t + \beta_4 * NWC_t + \beta_5 * Capex_t \\ & + \beta_6 * InvSecu_t + \beta_7 * Levg_t + \beta_8 * DDiv_t + \beta_9 * BDtoTD_t + \varepsilon_t \end{aligned} \quad (1)$$

where

$MtoB_t$ = *Market to Book Ratio (1986-1990)*
$RSize_t$ = *Real Size (1986-1990)*
CF_t = *Cash Flow (1986-1990)*
NWC_t = *Net Working Capital (1986-1990)*
$Capex_t$ = *Capital Expenditures (1986-1990)*
$InvSecu_t$ = *Investing Securities (1986-1990)*
$Levg_t$ = *Total Leverage (1986-1990)*
$DDiv_t$ = *Dividend Dummy (1986-1990)*
$BDtoTD_t$ = *Bank Debt to Total Debt (1986-1990)*

Market-to-book ratio serves as the proxy for firms' growth opportunities. Real size is the natural logarithm of total assets, which is the variable controlling for the firm size. Cash flow and capital expenditures combined are the variables controlling for firms' flow-of-funds and investment policy. Net working capital is to determine firm's needs of funds. Total leverage (defined as the sum of short-term debt and long-term debt over total assets) is the sign for firm's capital structure where bank debt to total debt is the indicator of bank's influence. Dividend dummy is set equal to 1 when the firm pays out any cash dividends in that year.

Pinkowitz and Williason (2001) argue that banks' monopoly power is the direct

[16] Mikkelson and Partch (2003) do not provide any explanation why they choose the 2SLS method. Even though my analyzing method is adapted from their work; I might run the 2SLS base on a totally different standing ground from them.

reason why the Japanese firms maintain at the high cash holding position. When banks are more powerful over firms, banks simply make excess loans to firms and extract rents from firms. Hence, other than the cash holding determinants developed in Opler, Pinkowitz, Stulz, and Williason (1999), Pinkowitz and Williason (2001) add bank debt to total debt to incorporate banks influences.

In addition to Pinkowitz and Williason (2001), I add investing securities to incorporate the effects of Japanese firms' speculation activities during the late 1980s bubble economy. If profitable firms do not have viable positive net prevent value (NPV) projects, they might easily find some profitable substitutes in the booming capital market.

5.3 Estimates of Performance on Excess Cash

The second stage regression estimates the relations between operating performance and the unexplained excess cash from the first stage regression. The second stage estimate regression is:

$$Perf_i = \beta_0 + \beta_1 * UnexCASH_i + \beta_2 * PastPerf_i + \beta_3 * INSIDER_i + \beta_4 FinancialInst_i + \beta_5 * D * INSIDER_i + \beta_6 * D * FinlINST_i + \varepsilon_i \quad (2)$$

where

$Perf_i$ = *Operating Performance (1991-1995)*

$UnexCASH_i$ = *Unexplained Excess Cash*

$PastPerf_i$ = *Past Operating Performance (1986-1990)*

$INSIDER_i$ = *Insiders' Ownership (1986-1990)*

$FinlINST_i$ = *Financial Institutes' Equity Holdings (1986-1990)*

D = *Dummy for Positive Unexplained Excess Cash*

Unexplained excess cash is the prediction error of cash from regression (1). Current performance is assumed to be correlated to the cash holding level in the previous period. Hence, the dependent variable in regression (2) is the operating performance in 1991-1995. To control for the persistence in performance, the operating performance in 1986-1990 is included.

Other than unexplained excess cash, insiders' ownership (ratio of directors' share holdings over total outstanding shares) and financial institute ownership (ratio of the equity holdings of financial institute over total outstanding shares) are regressed on operating performance to control for managerial incentives and bank influences.[17]

Dummy for positive unexplained excess cash is set equal to 1 when the unexplained excess cash is positive or zero otherwise. Dummy for positive unexplained excess is intended to test if the firm's performance interacts with insider holding or financial institute holding conditioning on firms hold more cash than expected.

[17] Regression (2) is also modified from Mikkelson and Partch (2003). However, I include bank influence to emphasize the differences in governing system between the U.S. firms and the Japanese firms as argued in many prior studies (e.g. Morck, Nakamura and Shivdasani [2000], Pinkowitz and Williason [2001]).

Table 3 - Regressions of Financial Determinants on Cash Holdings.

	High Cash Firms		Low Cash Firms	
Variable	OLS	Fama-MacBeth	OLS	Fama-MacBeth
Constant	***0.462549	***0.515334	***0.133593	***0.125129
	(3.150)	(3.791)	(9.500)	(9.407)
Market to Book Ratio	***-0.038568	**-0.044144	0.001742	0.002457
	(-3.653)	(-3.3623)	(0.814)	(1.116)
Real Size	0.018075	0.013204	-0.000752	-0.000064
	(1.507)	(1.435)	(-0.662)	(-0.063)
Cash Flow	***3.780317	***3.752606	0.025846	0.029315
	(14.719)	(9.964)	(0.339)	(0.364)
Net Working Capital	***-0.759945	***-0.738650	-0.012886	-0.016056
	(-14.509)	(-9.290)	(-0.153)	(-1.492)
Capital Expenditures	***-0.743890	***-0.658164	***-0.092144	**-0.100814
	(-6.471)	(-4.540)	(-3.967)	(-3.740)
Investing Securities	0.094904	0.089604	***-0.102667	**-0.070032
	(0.454)	(0.462)	(-3.081)	(-2.596)
Total Leverage	0.503057	0.433942	**-0.090354	**-0.099315
	(1.471)	(1.024)	(-2.761)	(-3.900)
Dividend Dummy	0.009544	0.017876	**-0.008553	**-0.009273
	(0.360)	(0.675)	(-2.181)	(-3.101)
Bank Debt to Total Debt	-0.346184	-0.275798	**0.075289	**0.078000
	(-1.634)	(-1.049)	(2.604)	(3.222)
F-statistic (p-value)	66.43 (0.000)		4.414 (0.000)	
Adjusted R^2	0.4573	0.44298	0.0634	0.02598

*, **, and *** indicate variable significant at 10%, 5%, and 1% level respectively. The dependent variable is cash over operating assets in 1986 to 1990. The fixed-effect t-statistics are reported in the parentheses. The adjusted R^2 of fixed-effects model is calculated without fixed-effects. Fama-MacBeth indicates that a cross-sectional regression is estimated each year and the average coefficients are calculated from the time series coefficients generated by the annual cross-sectional regressions. The Fama-MacBeth t-statistics are calculated using the Newey-West procedure for corrected for autocorrelation standard errors. High cash firms are firms that persistently hold the ratio of cash to total assets in excess of .25 at the end of each of the years 1986-1990. Low cash firms are firms that persistently hold the ratio of cash to total assets less than .15 at the end of each of the years 1986-1990. The sample consists of 140 high cash firms and 91 low cash firms for each single year.

Definition of Variables: *Cash*: (Cash and Deposits + Marketable Securities) / Operating Assets. *Market to Book Ratio of Assets*: (Market Capitalization + Book Value of Debt) / Total Assets. *Operating Assets*: Total Assets - Cash and Deposits - Marketable Securities. *Real Size*: Natural Logarithm of the Total Assets. *Cash Flow*: (Ordinary Income - Interest Expense and Discount Charges - Taxes - Dividends) / Operating Assets. *Net Working Capital*: (Current Assets - Cash - Current Liabilities) / Operating Assets. *Capital Expenditures*: (Change in Fixed Assets + Depreciation) / Operating Assets. *Investing Securities*: Investing Securities / Operating Assets. *Total Leverage*: (Short-term Debt + Long-term Debt) / Total Assets. *Dividend Dummy*: Set equal to 1 if the firm pays out a dividend in the specified year and zero otherwise.

6. Empirical Results

6.1 Expected Cash Holding Levels

Results of regressions (1) are documented in Table 3. Both the high cash firms and low cash firms are selected based on the level the persistent high cash/low cash holding position in 1986-1990. In addition to the panel regression, I also present the Fama-MacBeth cross-sectional regression to estimate the cash holding levels (Fama and MacBeth, 1973). Fama-MacBeth regression is estimated using the following steps. For each year, an annual cross-sectional regression is estimated. The time series coefficients are used to calculate the average coefficients. At last, I use the Newey-West procedure to produce the corrected for the autocorrelation standard errors for calculating the Fama-MacBeth t-statistics.

I find that the cash holding levels of the low cash firms are negatively correlated with the capital expenditures, investing securities, leverage and dividend, but are positively

corrected with the levels of bank debt to total debt. The coefficients of the above variables are both statistically and economically significant. The panel regression and Fama-MacBeth regression produce consistent and comparable results. This suggests that cash holding levels of the low cash firms are persistent through time.

With the influences of the powerful banks, firms' cash holdings are expected to increase with the bank debts. My results are consistent with Pinkowitz and Williason (2001) since cash holdings are positively correlated to bank debt ratio. Cash holdings of the low cash firms are also negatively correlated (-0.10 and -0.07) to the investing securities. This is also consistent with my hypothesis that firms without viable NPV projects simply purchase securities from the capital market.

In contrast to the low cash firms, I find cash holding levels of the high cash firms decrease with market-to-book ratio, capital expenditures and net working capital, but increase with cash flow. Again, the coefficients of these variables are both statistically and economically significant. The results generated by panel regression and Fama-MacBeth regression are comparable to each other. This suggests that cash holding levels of the high cash firms are also persistent through time.

The evidences indicate that while high cash firms spend more money in acquiring fixed-assets (coefficients of capital expenditures are -0.743 and -0.658), high cash firms need less funds for operating activities (coefficients of net working capital are -0.760 and -0.739) and are able to accumulate more cash (coefficients of cash flow are 3.78 and 3.725). Taking the fact that high cash firms do not have viable growth prospects (coefficients of market-to-book ratio are -0.039 and -0.044), the evidences suggest that high cash firms simply keep the cash within the firms.

The regression results suggest that the determinants of the cash holding levels of high cash firms and low cash firms are very different from each others. Of course, there is no reason that we should expect the cash determinants should be the same for firms with extremely high cash holding position and extremely low cash holding position. The only variable that correlates with cash holdings of both high cash firms and low cash firms is the capital expenditures; however, the magnitudes are also different (-0.744, -0.658 for high cash firms, and -0.092, -0.101 for low cash firms). It is obvious that high cash firms spend more cash in acquiring fix-assets than low cash firms do.

It is surprising that real size is not statistically significant for both high cash and low firms. This is inconsistent with the existing literature.[18] The straightforward interpretation is that firm size does not determine a firm's cash holding level once the firm's cash holding position is either extremely high or extremely low.

6.2 Cash Holding Effects on Performance

I estimate the effects of cash holdings on performance with regression (2). This is done by regressing operating performance on the unexplained excess cash, which is the prediction error on the cash from regression (1). The results of regression (2) are documented in Table 4.

The results confirm that the operating performance of both high cash firms and low cash firms are supported by their previous performance. This also confirms the

[18] Prior literature, for example, Rajan and Luigi Zingales (1995), Opler, Pinkowitz, Stulz and Williason (1999), and Pinkowitz and Williason (2001) all document significant correlation between a firm's size and its cash holding level. Mikkelson and Partch (2003) also find that high cash firms' cash holding level are significantly correlated to its size.

Table 4 - Regressions of the Relations between Operating Performance and Unexplained Excess Cash.

	High Cash Firms		Low Cash Firms	
Variable	OLS	Fama-MacBeth	OLS	Fama-MacBeth
Constant	0.004617	0.001604	***0.012754	***0.010740
	(0.989)	(0.287)	(5.556)	(4.445)
Unexplained Excess Cash	***-0.027559	-0.025803	***0.139270	*0.108491
	(-2.893)	(-1.785)	(2.979)	(2.565)
Past Operating Performance	***0.576896	***0.605254	***0.392315	***0.458079
	(23.840)	(15.215)	(10.721)	(9.724)
Insiders' Ownership 1986 - 1990	-0.052727	-0.078207	0.130684	0.133942
	(-1.088)	(-2.202)	(1.534)	(2.019)
Financial Institute Ownership	0.018188	0.014054	-0.017438	-0.024293
1986 - 1990	(0.931)	(0.967)	(-1.393)	(-2.350)
Dummy for Positive Excess Cash x	0.027538	-0.005775	-0.086041	-0.176157
Insider's Ownership	(0.311)	(-0.067)	(-0.846)	(-2.045)
Dummy for Positive Excess Cash x	*0.048990	*0.061180	0.003298	0.020440
Financial Institute Ownership	(1.795)	(2.490)	(-0.194)	(1.714)
F-statistic (p-value)	101 (0.000)		24.26 (0.000)	
Adjusted R^2	0.4620	0.4875	0.2351	0.2857

*, **, and *** indicate variable significant at 10%, 5%, and 1% level respectively. The dependent variable is ordinary incomes over operating assets from 1991 to 1995. The fixed-effect t-statistics are reported in the parentheses. The adjusted R^2 of fixed-effects model is calculated without fixed-effects. Fama-MacBeth indicates that a cross-sectional regression is estimated each year and the average coefficients are calculated from the time series coefficients generated by the annual cross-sectional regressions. The Fama-MacBeth t-statistics are calculated using the Newey-West procedure for corrected for autocorrelation standard errors. High cash firms are firms that persistently hold the ratio of cash to total assets in excess of .25 at the end of each of the years 1986-1990. Low cash firms are firms that persistently hold the ratio of cash to total assets less than .15 at the end of each of the years 1986-1990. The sample consists of 140 high cash firms and 91 low cash firms for each single year.
Definition of Variables: *Operating Performance*: Ordinary Incomes / Operating Assets. *Unexplained Excess Cash*: Residuals of Estimate Regression Reported in Table 3. *Past Operating Performance*: Operating Performance in 1986-1990. *Insider's Ownership Stakes*: Directors' Holding / Outstanding Shares. *Financial Institute Ownership*: Financial Institutes' Holding / Outstanding Shares. *Dummy for Positive Excess Cash*: Set equal to 1 when excess is positive and zero otherwise.

persistence of operating performance.

Mikkelson and Partch (2003) conclude that persistent large cash holdings do not hinder firms' operating performance base on the fact that unexplained excess cash does not interact with operating performance and any other ownership proxy.

I find that unexplained excess cash significantly decreases with the operating performance of high cash firms, but significantly increases with the operating performance of low cash firms. The Fama-MacBeth time series coefficients are not statistically significant; however, the value and sign of coefficients (-0.028 and -0.026 for high cash firms, and 0.139 and 0.108 for low cash firms) suggest that the magnitudes of variables are economically persistent. There are inconsistent with Mikkelson and Partch's (2003) results.

I find little evidence that ownership structure might affect firms' performance. None of the managerial ownership structure variable is statistically significant. On the other hand, Dummy for Positive Excess Cash x Financial Institute Ownership for the high cash firms is statistically and economically significant. Again, Fama-MacBeth time series coefficients are not statistically significant, but the value and sign of coefficients, 0.049 and 0.061, suggest that the magnitudes of variables are economically persistent. This implies that operating performance of the high cash firms benefit from holding more cash than expected and the equity holdings of financial institute of the firms might be the reason that causes such an increase.

6.3 Cross-Sectional Analysis on Operating Performance

The last estimate regression in this study examines the cross-sectional variation in operating performance among high cash firms and low cash firms. I estimate this regression by combining high cash firms and low cash firm into one sample. The form of the regression is:

$$\begin{aligned} Perf_t = {} & \beta_0 + \beta_1 * MtoB_t + \beta_2 PastPerf_t \\ & + \beta_2 * RSize_t + \beta_3 * CF_t + \beta_4 * NWC_t \\ & + \beta_5 * Capex_t + \beta_6 * InvSecu_t + \beta_7 * Levg_t \\ & + \beta_8 * BDtoTD_t + \beta_9 * Insider_t + \beta_{10} * Financial_t + \beta_{11} * DDiv_t + \varepsilon_t \end{aligned} \tag{3}$$

where

$Perf_t$ = *Operating Performance (1991-1995)*
$MtoB_t$ = *Market to Book Ratio (1991-1995)*
$PastPerf_i$ = *Past Operating Performance (1986-1990)*
$RSize_t$ = *Real Size (1991-1995)*
CF_t = *Cash Flow (1991-1995)*
NWC_t = *Net Working Capital (1991-1995)*
$Capex_t$ = *Capital Expenditures (1991-1995)*
$InvSecu_t$ = *Investing Securities (1991-1995)*
$Levg_t$ = *Total Leverage (1991-1995)*
$DDiv_t$ = *Dividend Dummy (1991-1995)*
$BDtoTD_t$ = *Bank Debt to Total Debt (1991-1995)*
$INSIDER_i$ = *Insiders' Ownership (1991-1995)*
$FinlINST_i$ = *Equity Holdings of Financial Institute (1991-1995)*

The dependent variable of regression (3) is the operating performance in 1991-1995. All variables in regression (3) are the 1991-1995 values except for the value of past operating performance in 1986-1990. Two new variables, financial institute ownership and managerial ownership (insiders), are added to regression (3) to incorporate insiders' and banks' presence.

Considering that regression (3) is estimated with a combined sample, I estimate regression (3) with a fixed-effects model (Greene, 2002). I also estimate regression (3) with the Fama-MacBeth methodology with the same treatments used to estimate regression (1) and regression (2).

I find that operating performance increases with cash, past performance, market-to-book ratio, cash flow, leverage and financial institute ownership while decreases with net working capital.

Table 5 - Cross-sectional Regressions of Operating Performance on Firm Characteristics, 1991-1995.

Variable	Fixed-Effects	Fama-MacBeth
Constant	-0.0015952	0.0013249
	(-0.188)	(0.120)
Cash	***0.0322031	***0.0283662
	(11.768)	(7.827)
Operating Performance (1986-1990)	***0.1323221	***0.1428858
	(11.855)	(7.805)
Real Size	0.0007807	0.0006999
	(1.257)	(0.978)
Market to Book Ratio	***0.0069700	**0.0081775
	(4.843)	(2.757)
Cash Flow	***1.1917876	***1.1922221
	(55.724)	(24.522)
Net Working Capital	***-0.0188106	**-0.0178832
	(-4.045)	(-2.551)
Capital Expenditures	**0.0225135	-0.0179379
	(2.088)	(-1.445)
Investing Securities	0.0041259	0.0028394
	(0.326)	(0.213)
Total Leverage	***0.0612088	*0.0534689
	(4.422)	(2.575)
Bank Debt to Total Debt	**-0.0223138	-0.0179507
	(-2.058)	(-1.423)
Insiders' Ownership	-0.0255911	-0.0236779
	(-1.282)	(-1.247)
Financial Institute Ownership	**0.0103487	**0.0140615
	(1.985)	(3.172)
Dividend Dummy	*0.0076683	*0.0052430
	(1.699)	(2.440)
F-statistic (p-value)	789.9 (0.000)	
Adjusted R^2	0.8989	0.9108

*, **, and *** indicate variable significant at 10%, 5%, and 1% level respectively. The dependent variable is ordinary incomes over operating assets from 1991 to 1995. The fixed-effect t-statistics are reported in the parentheses. The adjusted R^2 of fixed-effects model is calculated without fixed-effects. Fama-MacBeth indicates that a cross-sectional regression is estimated each year and the average coefficients are calculated from the time series coefficients generated by the annual cross-sectional regressions. The Fama-MacBeth t-statistics are calculated using the Newey-West procedure for corrected for autocorrelation standard errors. High cash firms are firms that persistently hold the ratio of cash to total assets in excess of .25 at the end of each of the years 1986-1990. Low cash firms are firms that persistently hold the ratio of cash to total assets less than .15 at the end of each of the years 1986-1990. The sample consists of 140 high cash firms and 91 low cash firms for each single year.

Definition of Variables: *Operating Performance*: Ordinary Incomes / Operating Assets. *Cash*: (Cash and Deposits + Marketable Securities) / Operating Assets. *Past Operating Performance*: Operating Performance in 1986 – 1990. *Market to Book Ratio of Assets*: (Market Capitalization + Book Value of Debt) / Total Assets. *Operating Assets*: Total Assets - Cash and Deposits - Marketable Securities. *Real Size*: Natural Logarithm of the Total Assets. *Cash Flow*: (Ordinary Income - Interest Expense and Discount Charges - Taxes - Dividends) / Operating Assets. *Net Working Capital*: (Current Assets - Cash - Current Liabilities) / Operating Assets. *Capital Expenditures*: (Change in Fixed Assets + Depreciation) / Operating Assets. *Investing Securities*: Investing Securities / Operating Assets. *Total Leverage*: (Short-term Debt + Long-term Debt) / Total Assets. *Insider's Ownership Stakes*: Directors' Holding / Outstanding Shares. *Financial Institute Ownership*: Financial Institutes' Holding / Outstanding Shares. *Dividend Dummy*: Set equal to 1 if the firm pays out a dividend in the specified year and zero otherwise.

As expected, operating performance is supported by the operating performance in the previous period. The positive significantly correlation between cash and operating performance confirms that to some extent that performance is built on burning cash. The market-to-book ratio is also positively correlated to the operating performance. This shows that both high cash firms and low cash firms still have room for growth. Though, the magnitudes of the market-to-book ratio, 0.0067 with fixed-effects model and 0.0079 with Fama-MacBeth model, suggest that the room for firms to grow might be confined

Table 6 - Panel A: Comparative Statistics of High Cash Firms and Low Cash Firms in 1991-1995.

Variable	High Cash Firms		Low Cash Firms	
	Mean (t-statistics)	Median (z-statistics)	Mean	Median
Cash	***0.56004 (27.40)	***0.46567 (26.522)	0.09828	0.08743
Real Size (JPY)	***11.67469 (-6.91)	***11.44216 (-4.177)	12.21466	12.10264
Real Sales (JPY)	***11.39055 (-9.11)	***11.28476 (-6.103)	12.05921	12.06757
Market to Book Ratio of Assets	***1.42595 (2.76)	1.28676 (0.638)	1.33347	1.27631
Cash Flow	***0.02471 (11.99)	***0.02230 (15.807)	-0.01022	-0.00925
Net Working Capital	-0.00015 (0.54)	***0.02352 (3.407)	-0.00643	-0.01636
Capital Expenditures	***0.06553 (3.57)	***0.05405 (2.685)	0.05030	0.04371
Investing Securities	***0.08235 (8.24)	***0.06923 (7.862)	0.05246	0.03771
Total Leverage	***0.09785 (-19.93)	***0.05630 (-15.373)	0.27604	0.24788
Dividend	***0.00212 (5.36)	***0.00000 (2.185)	0.00083	0.00000
Short-term Debt	***0.10375 (-8.45)	***0.05183 (-12.725)	0.17372	0.16015
Long-tern Debt	***0.04684 (-13.16)	***0.01417 (-12.123)	0.12696	0.09799
Bank Debt to Total Debt	***0.18398 (-16.30)	***0.13870 (-13.808)	0.36556	0.36424
Insiders' Ownership	***0.02559 (6.12)	***0.00210 (4.998)	0.01059	0.00000
Financial Institute Ownership	***0.17941 (4.79)	***0.16843 (4.998)	0.12555	0.00000

*, **, and *** indicate variable differences from the low cash firm significant at 10%, 5%, and 1% level respectively. The t-statistics in the parentheses are produced by t-test; and z-statistics by non-parametric test. High cash firms are firms that persistently hold the ratio of cash to total assets in excess of .25 at the end of each of the years 1986-1990. Low cash firms are firms that persistently hold the ratio of cash to total assets less than .15 at the end of each of the years 1986-1990. The sample consists of 140 high cash firms and 91 low cash firms for each single year.

Definition of Variables: *Cash*: Cash and Deposits + Marketable Securities / Operating Assets. *Market to Book Ratio of Assets*: (Market Capitalization + Book Value of Debt) / Total Assets. *Operating Assets*: Total Assets - Cash and Deposits - Marketable Securities. *Real Size*: Natural Logarithm of the Total Assets. *Real Sales*: Natural Logarithm of Sales. *Cash Flow*: (Ordinary Income - Interest Expense and Discount Charges - Taxes - Dividends) / Operating Assets. *Net Working Capital*: (Current Assets - Cash - Current Liabilities) / Operating Assets. *Capital Expenditures*: (Change in Fixed Assets + Depreciation) / Operating Assets *Investing Securities*: Investing Securities / Operating Assets. *Total Leverage*: (Short-term Debt + Long-term Debt) / Total Assets *Dividend*: Cash Dividends / Operating Assets. *Short-term Debt*: Short-term Debt / Operating Assets. *Long-term Debt*: Long-term Debt / Operating Assets.

due to the severe business environment in 1991-1995.

Cash flow and net working capital are also statistically and economically significantly correlated to operating performance. Taking into consideration the fact that market-to-book ratio is also positive significantly correlated to operating performance; this can be interpreted as these firms have some positive net present value projects being undertaken. Thus, the investments on these positive NPV projects lead to better performance of the firms.

I also find that leverage and financial institute ownership have positive correlation with operating performance. The results confirm the conclusion in the prior literature.

Table 6 - Panel B: Comparative Statistics of High Cash Firms in 1986-1995.

Variable	1991-1995 Mean (t-statistics)	1991-1995 Median (z-statistics)	1986-1990 Mean	1986-1990 Median
Cash	***0.56004 (-8.70)	***0.46567 (-9.404)	0.74213	0.61862
Real Size (JPY)	***11.67469 (7.19)	***11.44216 (5.343)	11.27370	11.06061
Real Sales (JPY)	**11.39055 (2.04)	11.28476 (1.176)	11.26078	11.18573
Market to Book Ratio of Assets	***1.42595 (-8.76)	***1.28676 (-10.794)	1.87291	1.60160
Cash Flow	***0.02471 (-5.04)	***0.02230 (-5.771)	0.04022	0.03435
Net Working Capital	***-0.00015 (5.13)	***0.02352 (4.168)	-0.07455	-0.03494
Capital Expenditures	***0.06553 (-3.35)	***0.05405 (-3.954)	0.08202	0.06995
Investing Securities	*0.08235 (1.82)	0.06923 (1.176)	0.07631	0.06483
Total Leverage	0.09785 (-0.82)	0.05630 (-0.962)	0.10326	0.06078
Dividend	***0.00212 (-5.16)	***0.00000 (-4.937)	0.00381	0.00000
Short-term Debt	***0.10375 (-4.19)	**0.05183 (-2.565)	0.14920	0.07164
Long-tern Debt	**0.04684 (2.10)	***0.01417 (4.275)	0.03778	0.00679
Bank Debt to Total Debt	0.18398 (0.38)	0.13870 (-0.214)	0.18034	0.14019
Insiders' Ownership	***0.02559 (-2.97)	0.00210 (-0.428)	0.03474	0.00237
Financial Institute Ownership	*0.17941 (1.95)	0.16843 (1.123)	0.16011	0.08700

*, **, and *** indicate variable differences from the low cash firm significant at 10%, 5%, and 1% level respectively. The t-statistics in the parentheses are produced by t-test; and z-statistics by non-parametric test. High cash firms are firms that persistently hold the ratio of cash to total assets in excess of .25 at the end of each of the years 1986-1990. Low cash firms are firms that persistently hold the ratio of cash to total assets less than .15 at the end of each of the years 1986-1990. The sample consists of 140 high cash firms and 91 low cash firms for each single year.

Definition of Variables: *Cash*: Cash and Deposits + Marketable Securities / Operating Assets. *Market to Book Ratio of Assets*: (Market Capitalization + Book Value of Debt) / Total Assets. *Operating Assets*: Total Assets - Cash and Deposits - Marketable Securities. *Real Size*: Natural Logarithm of the Total Assets. *Real Sales*: Natural Logarithm of Sales. *Cash Flow*: (Ordinary Income - Interest Expense and Discount Charges - Taxes - Dividends) / Operating Assets. *Net Working Capital*: (Current Assets - Cash - Current Liabilities) / Operating Assets. *Capital Expenditures*: (Change in Fixed Assets + Depreciation) / Operating Assets *Investing Securities*: Investing Securities / Operating Assets. *Total Leverage*: (Short-term Debt + Long-term Debt) / Total Assets *Dividend*: Cash Dividends / Operating Assets. *Short-term Debt*: Short-term Debt / Operating Assets. *Long-term Debt*: Long-term Debt / Operating Assets.

According to Pinkowitz and Williason (2001), Japanese firms' performance is hindered by the presence of powerful banks. My results indicate that when banks' influences became less powerful since the late 1980s, firms and banks developed decent cooperation relation to face the severe business environment.

6.4 Differences between Early 1990s and Late 1980s

To further compare the differences between high cash firms and low cash firms, I document three comparison summary statistics in Table 6. Panel A compares the differences between high cash firms and low cash firms in 1991-1995. Panel B compares the differences of high cash firms between 1986-1990 and 1991-1995 while

Table 6 - Panel C: Comparative Statistics of Low Cash Firms in 1986-1995.

Variable	1991-1995 Mean (t-statistics)	1991-1995 Median (z-statistics)	1986-1990 Mean	1986-1990 Median
Cash	***0.09828	***0.08743	0.11737	0.11843
	(-5.65)	(-9.343)		
Real Size (JPY)	***12.21466	**12.10264	11.86429	11.72892
	(3.31)	(2.187)		
Real Sales (JPY)	***12.05921	***12.06757	11.43831	11.35310
	(7.19)	(5.102)		
Market to Book Ratio of Assets	***1.33347	***1.27631	1.76681	1.55000
	(-11.23)	(-10.138)		
Cash Flow	***-0.01022	*-0.00925	-0.00493	-0.00352
	(-2.84)	(-1.922)		
Net Working Capital	***-0.00643	***-0.01636	-0.04277	-0.05043
	(3.58)	(3.407)		
Capital Expenditures	**0.05030	***0.04371	0.06125	0.05717
	(-2.38)	(-3.247)		
Investing Securities	0.05246	0.03771	0.04908	0.03573
	(1.02)	(0.596)		
Total Leverage	0.27604	0.24788	0.29379	0.25126
	(-1.37)	(-0.199)		
Dividend	0.00083	*0.00000	0.00107	0.00000
	(-1.62)	(-1.671)		
Short-term Debt	***0.17372	**0.16015	0.20468	0.17965
	(-3.68)	(-2.452)		
Long-tern Debt	0.12696	*0.09799	0.12357	0.07878
	(0.38)	(1.921)		
Bank Debt to Total Debt	0.36556	0.36424	0.37887	0.36904
	(-0.97)	(-0.596)		
Insiders' Ownership	***0.01059	0.00000	0.01547	0.00000
	(-2.59)	(0.0000)		
Financial Institute Ownership	0.12555	0.00000	0.12129	0.00000
	(0.36)	(0.0000)		

*, **, and *** indicate variable differences from the low cash firm significant at 10%, 5%, and 1% level respectively. The t-statistics in the parentheses are produced by t-test; and z-statistics by non-parametric test. High cash firms are firms that persistently hold the ratio of cash to total assets in excess of .25 at the end of each of the years 1986-1990. Low cash firms are firms that persistently hold the ratio of cash to total assets less than .15 at the end of each of the years 1986-1990. The sample consists of 140 high cash firms and 91 low cash firms for each single year.

Definition of Variables: *Cash*: Cash and Deposits + Marketable Securities / Operating Assets. *Market to Book Ratio of Assets*: (Market Capitalization + Book Value of Debt) / Total Assets. *Operating Assets*: Total Assets - Cash and Deposits - Marketable Securities. *Real Size*: Natural Logarithm of the Total Assets. *Real Sales*: Natural Logarithm of Sales. *Cash Flow*: (Ordinary Income - Interest Expense and Discount Charges - Taxes - Dividends) / Operating Assets. *Net Working Capital*: (Current Assets - Cash - Current Liabilities) / Operating Assets. *Capital Expenditures*: (Change in Fixed Assets + Depreciation) / Operating Assets *Investing Securities*: Investing Securities / Operating Assets. *Total Leverage*: (Short-term Debt + Long-term Debt) / Total Assets *Dividend*: Cash Dividends / Operating Assets. *Short-term Debt*: Short-term Debt / Operating Assets. *Long-term Debt*: Long-term Debt / Operating Assets.

Panel C compares the differences of low cash firms between 1986-1990 and 1991-1995. All numbers are scaled in operating assets, and each panel receives the same treatments as in Table 1.

Compare Table 6 Panel to Table 1, the difference between high cash firms and low cash firms are still the same. Low cash firms are still larger than high cash firms. Low cash firms also have more sales than high cash firms. High cash firms still spend more (larger cash flow, capital expenditures, and dividend payouts) but borrow less (lower leverage and debts) than low cash firms do. High cash firms also have more sufficient net working capital to finance short term liabilities. Though, the differences between high cash firms and low cash firms become closer.

Panel B compares the differences of high cash firms between 1986-1990 and 1991-1995. Panel B reveals that high cash firms in the early 1990s hold less cash compared to late 1980s. While firm size and sales continue to grow, the growth opportunities of high cash firms are less than what they used to have in the previous period. High cash firms also spend less (smaller cash flow and capital expenditures) and pay out less (cash dividends). Net working capital turns out to be positive numbers in 1991-1995. As to the leverage, there is no significant difference. This is because while the high cash firms increase their long-term debts, they also decrease the short-term debts in the same time. There are also decreases in directors' holdings and increases in financial institute ownership.

Panel C compares the differences of low cash firms between 1986-1990 and 1991-1995. Panel C reveals that low cash firms in the early 1990s also hold less cash compared to late 1980s. While firm size and sales continue to grow, the growth opportunities of low cash firms are also less than what they used to have in the previous period. High cash firms also spend less (smaller cash flow and capital expenditures) and pay out less (cash dividends). Low cash firms do have more net working capital in the early 1990s than in the late 1980s; however, net working capital is still negative. As to the leverage, the only indicator to be noted is that low cash firms have less short-term debts while there is no other significant difference. There are also decreases in directors' holdings.

7. Concluding Remarks

This paper investigates how Japanese firms operate with high/low cash holding position. The purpose of this study is to find out if large cash holdings cause performance to deteriorate. I compare the operating performance associated with high cash firms (firms that persistently hold the ratio of cash to total assets in excess of .25 at the end of each of the years 1986-1990) and low cash firms (firms that persistently hold the ratio of cash to total assets less than .15 at the end of each of the years 1986-1990) across the late 1980s and early 1990s.

I find that operating performance of the high cash firms is significantly greater than firms that maintained low cash holdings in the late 1980s. High cash firms are associated with less debt, but more payouts and investments expenditures. In the mean while, I find little evidence that suggests ownership structure might be affecting the operating performance. Proxies for insider influences and outsider presences are all found unrelated to firms' performance and implies the fact that interests of the director's ownership were unrelated to Japanese firms' operating performance.

I find the cash holding determinants that comprise high/low cash holding firms are different. High cash firms are not surrounded with lenient investing opportunities; therefore, other than acquiring some fixed-assets the high cash firms simply keep the money within the firms. On the other hand, without lenient growth opportunities low cash firms borrow a lot from the banks, over-invest in acquiring fixed-assets and play money game in the capital market.

One major finding of this paper is that the excess cash of high cash firms are found negatively correlated to the operating performance while the excess cash of low cash firms are found positively correlated to the operating performance. This suggests that

large cash holdings might hinder performance of those firms that have had a lot of cash in hand already. On the other hand, operating performance of the low cash firms might be improved by holding more cash. The evidences presented in this study are however inconsistent with Milkkelson and Partch (2003) where they find no relation at all between firms' excess cash holdings and the operating performance. This inconsistency may due to the different governing system between two countries.

This paper provides a valuable exercise of examining persistent large cash holdings in Japan. Future research could explore cash holdings, financial leverage, equity payout, and firms' performance to find out in general that if the cash holdings boost performance or hinder performance.

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